The Dark Side of Social Media Engagement: An Analysis of User-Generated Content in Online Wildlife Trade Communities

Kim Feddema
The University of Western Australia, Australia

Paul Harrigan
Zayed University, United Arab Emirates
The University of Western Australia, Australia
paul.harrigan@uwa.edu.au

Shasha Wang
Queensland University of Technology, Australia

Abstract

There is a growing academic interest on the dark side of engagement on social media and the role of user-generated content (UGC). The illicit trade of wildlife online is a major contributor to global species loss and, thus, strategies to reduce demand for wild species and consumer engagement in the market and are of paramount importance. We first conduct qualitative analyses on a large data set of UGC (n=14,729 words from 1060 comments from 12 Facebook groups) from a biodiversity hotspot, The Republic of Indonesia. We use automatic machine-learning lexical software to explore the discourse that occurs in comments of posts that promote behaviour change and demand reduction. Then, to examine the efficacy of these posts, we test an extended elaboration likelihood model to determine the nature of information processing that leads viewers to agree with wildlife conservation content. Our results show that motivation, opportunity and ability factors moderate the relationship between information processing and comment valence, as well as influencing whether comments indicate attitude change. This work extends the use of theory from information systems and marketing to conservation, and provides both conceptual and practical recommendations to encourage behaviour change and reduce the harmful effects of engagement.

Keywords: consumer engagement, wildlife trade, UGC, MOA, ELM

1 Introduction

Consumer engagement has received attention across multiple disciplines, from marketing to education to social psychology (Alvarez-Milán et al., 2018; Beckers, Van Doorn & Verhoef, 2018; Harmeling et al., 2017). According to Brodie et al. (2013) "Consumer engagement in a virtual brand community involves specific interactive experiences between consumers and the brand, and/or other members of the community… [It] is a multidimensional concept comprising cognitive, emotional, and/or behavioural dimensions, [which] plays a central role in the process of relational exchange" (Brodie et al., 2013 p. 107). In practice, it is characterised by interactive user behaviours, such as writing a review on social media, commenting on an Instagram post, responding to questions in a discussion forum, or using a brand's hashtag (Beckers, Van Doorn & Verhoef, 2018; Eigenraam et al., 2018; Schivinski, Christodoulides & Dabrowski, 2016). This user-generated content (UGC) is defined as content that i) is made

publicly available over the Internet, ii) reflects a certain amount of creative effort, and iii) is created outside of professional routines and practices (Vickery & Wunsch-Vincent, 2007).

Recently, consumer engagement research has begun considering the potential negative impacts of consumer interactions online. Baccarella et al. (2018) identified seven building blocks of the "dark side" of social media, (i) sharing inappropriate content, (ii) location tracking, (iii) misinformation, disinformation and aggressive engagement, (iv) exploitation of the online self (v) threat, coercion, abuse and intimidation, (vi) in-group out-group bias and (vii) shaming and defamation. This is supported by research that has found controversial and/or negative content is overrepresented on social media platforms and that UGC can result in the proliferation of hate speech, pornography, and defamation, and create communities that encourage violence, self-harm and invasion of privacy (George & Scerri, 2007; Shelton & Skalski, 2014). More recently, research has explored UGC that stretches to criminal activity, including radicalisation and the spread of terrorism (Lara-Cabrera, Gonzalez-Pardo, & Camacho, 2019; Yar, 2018). Traditionally, illicit or taboo contexts can be difficult, or even dangerous, to research. Therefore, investigating UGC online may be critical to understanding previously inaccessible phenomena (Mackey, et al., 2018; Skålén, Aal, & Edvardsson, 2015).

One such phenomenon is the trade of wild animals, which contributes to the decline of many species across the globe (Esmail et al., 2019). Within online wildlife trade communities, species are bought and sold by social media users, who either post as individual traders or who represent brands. As a result, there is growing desire from conservation practitioners to utilise social media as a tool to reduce the supply and demand of wildlife products to protect both animal populations and public health (Blundell & Mascia, 2005; Martin et al., 2018; Nijman, 2010; Nijman et al., 2012; Veríssimo & Wan, 2018; Yar, 2018). Such initiatives primarily provide messages aimed at creating attitude change and encouraging pro-environmental actions (Moorhouse et al., 2020; Veríssimo & Wan, 2018). In our context, these messages take the form of demand reduction posts that explain relevant laws governing the breeding and ownership of wildlife, or that use emotive imagery and examples to show the negative impacts of wildlife ownership on welfare and conservation. Note that not all social media users within trade groups will view these messages. Therefore, in our paper we distinguish between the term, 'users' (i.e. all group members), and 'viewers' (i.e. those who have looked at the post). Additionally, we do not have access to data around the reach or number of views of posts, but rather UGC, which represents only the opinion of 'commenters' (i.e. those viewers who have commented on the post). This is a higher-order form of behavioural engagement. Few attempts have been made to examine the efficacy of these conservation programs in shifting stakeholder attitudes and behaviours online within a real-world context (Moorhouse, et al., 2017; Nuno et al., 2018). From an information systems perspective, UGC posted in direct response to such content presents a unique opportunity to inform and improve strategies to alter consumer behaviour.

In this paper, we first provide an overview of the literature on social media engagement, online wildlife trade communities, and two behaviour change theories – The Elaboration Likelihood Model (ELM) and Motivation-Opportunity-Ability Theory (MOA) previously, used to elicit detailed insights into attitude formation in social media communities (Abid, Harrigan, & Roy, 2019; Pee & Lee, 2016; Roy, Balaji, & Nguyen, 2020). Underpinning our research in these theories enables us to leverage the opportunity that UGC provides to explore consumer

sentiment, information sharing, and the psychological processes that are required to convince consumers to shift their attitudes and behaviours.

Then, across two studies, we assess the responses uploaded by group members on demand reduction posts within online wildlife trade communities across Indonesia. Over a period of 10 months we conducted passive observations in 12 Facebook groups from across Java and Sumatra that advertise native Indonesian species for sale. We then collected and analysed a final dataset totalling 36 posts and 1060 comments. Study 1 uses the semantic analysis program Leximancer 4.5.1 to complete a detailed and objective textual analysis of the data and investigate comments responding to demand reduction posts. We highlight salient concepts and operationalise the dimensions of MOA present in the data. Study 2 builds on this by combining MOA Theory with the ELM in a quantitative model of information processing. This was used to test the role of cognitive routes and behavioural constructs on comment valence, defined here as the extent to which commenters agree or disagree with the content (positive and negative valence respectively).

The contributions of this research are four-fold. First, we exemplify the dark side of social media engagement in a unique context. We apply semantic analysis to shed light on the community response to demand reduction posts that aim to educate viewers on the ethics and legality of their behaviours, and shift consumers to adopt pro-conservation attitudes. Second, we extend the ELM with MOA Theory, and apply it in a unique context to explore how post attributes and group members' attitudes influence their behaviours upon viewing conservation messages. Third, we collect and analyse a large UGC dataset and use it to operationalise key concepts, which is especially meaningful given the dominant role of UGC in the dark side of engagement where traditional self-report surveys may not be possible, or may not reflect real-world behaviours. Finally, we provide actionable recommendations for conservation marketers and IS managers using social media posts for behaviour change initiatives, such as effective post length, content types and monitoring strategies.

2 Literature Review

2.1 The dark side of engagement

Research has shown how online engagement can have negative impacts on business success (Hollebeek & Chen, 2014; Juric, Smith, & Wilks, 2016) and users' mental health and wellbeing, with active engagement with peers on social media sites, such as Facebook, leading to significant feelings of stress, jealousy and anxiety in young people (Fox and Moreland, 2015). For example, in some circumstances the negative emotions that arise due to comparing oneself to others can result in increased negative body image in young women (Hogue & Mills, 2019) or depressive symptoms (Feinstein et al., 2013). On a wider scale, Pearce (2015) demonstrated the use of social media by an authoritarian power to coerce the public and maintain political control. Finally, Aswani, Kar & Ilavarasan (2019) highlight the devastating consequences for both individuals and institutions if users spread misinformation through UGC on social platforms, particularly where that information pertains to medical, criminal or political content.

2.2 Online wildlife trade

Few studies have extended the engagement literature to the consequences that arise when engagement on social media fosters demand for illicit products, other than limited research on

the trade of drugs and alcohol (Alhabash et al., 2015; Lavorgna, 2016; van de Ven & Koenraadt, 2017). In the wildlife trade context, illicit behaviour includes the sale of protected species, the sharing of animal cruelty images and misinformation, and privacy issues (Feddema et al., 2020; Morcatty et al., In Press). Engagement with UGC in particular can lead to harmful behaviours not only for the content creator, due to health and legal risks posed from handling dangerous and illegal wildlife, but also the animals at the centre of the trade, and indeed the environmental ecosystem.

The use of online social media platforms for the trade of wildlife has facilitated the sale of millions of plants and animals and is a major contributor to global species loss, (Esmail et al., 2019; Kareiva et al., 2002; Krishnasamy & Stoner, 2016; Phassaraudomsak & Krishnasamy, 2018). Social media significantly increases the capacity for vendors to engage with potential consumers and has serious and widespread consequences, both for the global conservation of species as well as for human health, as the current COVID-19 pandemic has illustrated. Morcatty et al. (In Press) showed that COVID-19 was used as by some vendors to increase sales of wild animals online and that few precautions were taken to reduce the risk of disease transfer between animals and humans. Across South East Asia, thousands of endangered species are sold per month over Facebook groups and Instagram posts. As one example, in 2016, 12 Thai Facebook groups were monitored for just 30 minutes per day and within a single 23-day period researchers had observed over 1521 animals from over 200 species being sold (Krishnasamy & Stoner, 2016; Phassaraudomsak & Krishnasamy, 2018). The scale and severity of South East Asian trade is therefore a current research priority for both academics and practitioners (Broad, 2020; Esmail et al., 2019; Kareiva et al., 2002).

2.3 Indonesian context

In this study, we specifically look at the trade in the Indonesian context. Indonesia experiences over-harvesting and illicit trade across all animal taxa and is the global epicentre of the songbird crisis (Nijman et al., 2017; Nijman et al., 2017a; Nijman, Shepherd, & Sanders, 2012). The two main governing bodies are i) the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES), which governs international trade of species between member nations, and (ii) the Directorate General of the Conservation of Natural Resources and Ecosystems (KSDAE) which falls under the Jakarta Ministry of Environment and Forestry (KLHK) and is responsible for national legislation. Programs and permits are then implemented and enforced on the ground by the Office of Conservation of Natural Resources (BKSDA). Additionally, the vulnerability of extant species is measured by the International Union of the Conservation of Nature (IUCN) and placed on a scale between the most at risk of extinction (Critically Endangered) and the least (Least Concern).

On the 1st of June 2018 Indonesia updated their list of protected species (Peraturan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia Nomor P.20) for the first time since 1999, adding hundreds of new species to the protected species list (Gokken, 2018). Additionally, during the period in which data were collected there were ongoing reports that the government may be considering revising the main regulation that governs wildlife trade (Undang-Undang Nomor 5 Tahun 1990) for the first time in 29 years (ICEL, 2019). In many cases, however, even legal species are subject to maximum harvesting or ownership quotas that are routinely flouted, making it impossible to determine the actual legality of individual animals. Finally, there may be species that are currently legal to own, yet are vulnerable to over-harvesting and population decline. Therefore, for this research we do not consider it

practically relevant to classify species traded according to their legality under national or international law.

2.4 Elaboration Likelihood Model

The Elaboration likelihood model (ELM) has been used in IS research over several decades to understand how people process information during attitude formation and behaviour change (Petty, Cacioppo, & Schumann, 1983). It posits that there are two processing routes within the brain (i) *the central route*, in which the viewer personally considers the information they feel is most important to establish their attitudinal position; (ii) *the peripheral route*, in which the viewer does not use their own judgement but is persuaded by simple cues that are associated either positively or negatively with the content. Literature suggests that when information processing occurs through *the central route*, attitudinal change is more likely to be enduring and predictive of future behaviours, whereas when information is processed through *the peripheral route* it is more likely to be temporary and susceptible to influence (Petty, Cacioppo, & Schumann, 1983).

Understanding the processing of information is therefore paramount to combatting the dark side of engagement and creating conservation education campaigns that lead to long-lasting behaviour change and positive conservation outcomes. The ELM framework has seen limited use in conservation projects, and has predominantly been used to evaluate the success of specific education campaigns in zoos or outreach programs (Gore et al., 2008; Jacobson et al., 2018; MacDonald, Milfont, & Gavin, 2016). In marketing, previous research has used the ELM to investigate what leads users to engage with mobile services (Narang, Jain, & Roy, 2012), Facebook second-hand marketplaces (Chang, Lu, & Lin, 2020), and even online health interventions (Short et al., 2015). It is also a well-accepted model in the IS research for use in testing the influence of cues on information technology acceptance (Bhattacherjee & Sanford, 2006; Li, 2013), web personalisation (Ho & Bodoff, 2014), and behaviour on social media (Abid, Harrigan & Roy, 2019; Chang, Yu, & Lu, 2015; Teng, Khong, & Goh, 2014).

2.5 Motivation-Opportunity-Ability Theory

Motivation-Opportunity-Ability (MOA) provides a detailed framework to understand the mechanisms behind information processing and the formation of attitudes (MacInnis & Jaworski, 1989). The theory posits that information processing occurs when the viewer is motivated and has both the ability and the opportunity to process information (Poiesz & Robben, 1996). This differs from ELM as it distinguishes between ability and opportunity and provides a more in-depth exploration of the determinants behind antecedents of behaviour (Petty et al., 2004). MOA theory can therefore complement the ELM in explaining the drivers of attitudes in our context.

Previous engagement research has used MOA theory to explain the user engagement process with social media information sharing (Pee & Lee, 2016), C2C exchanges (Gruen, Osmonbekov, & Czaplewski, 2005; Gruen, Osmonbekov, & Czaplewski, 2007) and hotel and travel marketing (Leung & Bai, 2013). While it is not yet widely used within IS research, recent work by Roy, Balaji & Nguyen (2020) uses the model to explore in-store smart technology adaptation. MOA theory has yet to be applied to the wildlife trade context.

3 Data Set

We accessed a range of Indonesian wildlife trade groups on Facebook and searched within them for all demand reduction posts. These posts included messages designed to reduce the demand for wildlife and limit the trade of animals within the groups, and/or providing information on the connection between trade behaviours, wild population decline and species conservation. To do this, we conducted a word search of the terms "BKSDA" as well as "Dilindungi", "Di Lindungi", "Konservasi" and "Apendik". We also included their English translations - "Threatened", "Protected", "Conservation" and "Appendix" respectively - and downloaded all posts that were returned. These search terms were selected using snowball sampling in which the main terms associated with demand reduction efforts in both Bahasa Indonesia and English were initially used and further searches were then conducted with spelling variants and terms discovered within the returned results. This was repeated until no more posts were returned and we had reached saturation. Data were downloaded directly from Facebook to give a final dataset of 36 posts that presented the negative aspects of wildlife trade and 1060 associated comments from 12 Facebook groups. Seven groups each had one post and five groups each had 2, 4, 6, 8 and 9 posts, respectively. These groups predominantly represented themselves as groups that facilitated the buying, selling or ownership of wildlife across all taxa, although two groups specialised in the trade of primates (N(posts) = 9) and songbirds (N(posts) = 11). Comments that were deemed to be 'noise' were removed from the dataset leaving a total of 188 comments comprised of 14,729 words for analysis. This data set was used for analysis in Studies 1 and 2.

3.1 Ethical Considerations

We acknowledge that our data contains potentially sensitive content, and significant effort was made to ensure all ethical considerations were met. While the content analysed was not intended to be used for research purposes, previous research suggests that there can be a reasonable expectation by users that social platforms are considered public spaces and that content uploaded to the sites may be viewed as such (Burkell et al., 2014). All data was passively collected from the groups without communicating with any group members about trade behaviours or interfering with any behaviour. Where we required permission from group administrators to gain access to groups, this was requested and granted on average within 24-48 hours, in-line with the experience of Siriwat, Nekaris & Nijman (2019). To reduce the risk to participants, all data were anonymised and no profile information was collected on group members. However, it should be noted that many profiles observed operated under pseudonyms, further suggesting an awareness that they may be observed. All work was completed with approval from the relevant university's Human Ethics Research Committee, under case number RA/4/20/5008.

4 Study 1

4.1 Semantic Analysis

Study 1 examined the text pattern of demand reduction posts and their comments, achieved through a semantic analysis with Leximancer. Online communities create large volumes of text-based data that can be analysed using 'text mining' software and semantic analysis to create a visualisation of the data and elaborate on common concepts and patterns within the

data[1]. Leximancer is an automated semantic mapping tool that uses statistical algorithms to analyse blocks of text and identify themes and concepts using frequencies and co-occurrences of words. While Leximancer does have the capacity to conduct sentiment analysis, this was not possible to complete in our case due to the nature of the unique sentence structure used in social media posts (Leximancer, 2017).

As Leximancer is fully enabled to process multiple languages, our analysis was conducted without having to first translate the data, reducing the risk of bias or error through mistranslation or misinterpretation by the research team (Leximancer, 2017). However due to the use of slang and dialects, data was cleaned and formatted prior to running the program to maximise the accuracy of interpretation. Due to ethical considerations, the researchers did not fully immerse themselves ethnographically in the groups, not taking part in any behaviours or discussions, but were able to passively follow the groups for ten months prior to the data analysis. This, along with experience in previous research, provided a level of fluency in the slang being used and thus an ability to recode words into official Bahasa Indonesia. During this process, the coder was careful not to change grammar or to add or remove any words that had the potential to change the meaning of the text. An illustrative example of this style of recoding is given below in English:

Commenter 1 – mi? dnt want td, can gv 30?
Commenter 1 (recoded) – How much is it? Don't want trade, can give 30?

After running the analyses, the data were sorted into files to allow for comparison between the groups and between the species clades and the PDF 'Data Exports' and 'Dashboard Reports' were downloaded (Wilk, Soutar & Harrigan, 2017). All outputs were reported in Bahasa Indonesia but have been translated for the purpose of this paper.

4.2 Results

We first provide context by reporting descriptive findings of the demand reduction messages to provide a full understanding of the information and the message framing that the commenters received. Our initial descriptive findings showed the top 10 concepts in order of relevance were *Protected, Fauna, Bird, Species, Wiratno, Captivity, Year, Flora, Nature* and *Community*. Figure 1 shows the Leximancer distance map, which indicates that the three most prominent themes (written in coloured font) are *Protected, Wiratno* and *Criminality*.

The *Protected* theme contains the concepts *flora* and *fauna* (written in black font), and these terms (or more specifically their Bahasa Indonesia equivalents) are more often used in 'scientific' or 'official' terminology, distinguishing them from the less significant theme 'animal' which is used more broadly. The theme also includes the concept *year* and this can be explained by the number of posts that contained direct quotes from the regulations, for example – *"Jakarta, Ministry of Environment and Forestry (KLHK), Monday, August 6, 2018.*

[1] A key benefit of using Leximancer is its ability to generate an impartial concept map using self-seeded constructs without requiring input from the researcher (Wilk, Soutar, & Harrigan, 2017). These maps can be read using a "heat map" approach in which the warmer the colour (i.e. towards the red/orange spectrum), the more central the theme is to the group. Additionally, the higher the number of concepts within a theme indicates that is it more prevalent in the text, however the size of the circle itself is not indicative of importance. The more overlap the themes have with one another the more linked the two are within the text and direct lines between concepts suggests that they are tightly linked within the text.

….There is an additional list of protected species of plants and animals in P.20 / 2018, which is 241 species or 26% of the list listed in the attachment to Government Regulation No. 7 of 1999".

Posts that directly quote official regulations also account for the second most prominent theme *Wiratno*, who is the Director General of the KSDAE, as well as the theme KLHK. The term protected specifically refers to legal protection and is not used to mean protected on an individual level or to be protected from immediate physical danger. This term is used both within the quotes from official KSDAE documentation, as above, but also by individual traders and commenters as illustrated by the following quotes – *"Buying, selling, possessing, raising endangered or protected species is against the law!!"* and *"it's better to delete maybe the posts with protected animals"*.

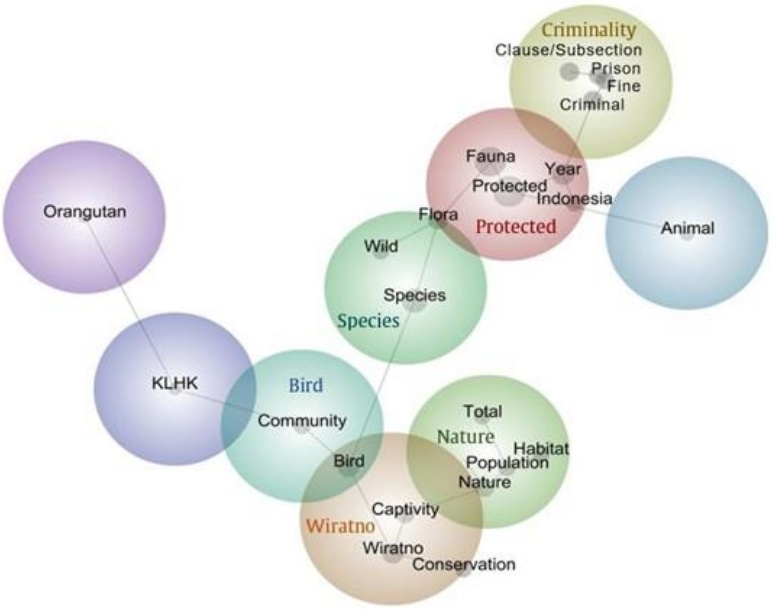

Figure 1. Leximancer distance map for all demand reduction posts

The next strongest theme, *Criminality*, shows that within these trade groups demand reduction messages are typically presented through the lens of rules and regulations, rather than moral or ecological arguments. This is further supported by the fact that all terms typically associated with ecological and biological conservation efforts are clustered within the theme *Nature*, which is a much cooler temperature on the heat map (i.e. less important within the discourse) and directly connected to the *Wiratno* theme. This is reflected in quotes such as "*Every person is prohibited from releasing protected animals from one place in Indonesia to another place in or outside Indonesia*".

The only biological clade strong enough to create a concept within the data is the bird clade. This concept is also directly linked to the term *community* and this is possibly due to the cultural role that birds play within Indonesian society or specifically in relation to the 'Kicau Mania' or songbird competition community that is highly prevalent in Java. All comments on these posts were then analysed separately and a second distance map was created (Figure 2). This was used to determine the most salient concepts to the commenters, as well as to operationalise the MOA dimensions for Study 2. The ranked concepts show the top ten concepts in order of relevance were *Protected*, *Animal*, *Bird*, *Sell*, *BKSDAE*, *Forest*, *Cat*, *Appendix*, *Know* and *Want*. The heat map in Figure 2 indicates three dominant themes within the

comments, being Protected, Species and Forest Cat in that order. It should be noted that in this context, the term BKSDAE was used as a port-manteau of the KSDAE and BKSDA.

The *Protected* theme differs in composition to the previous map of the demand reduction posts, encompassing a greater number of concepts, including the terms *Appendix* and *sell*. The *Appendix* concept is associated with the categorisation of species protected by CITES legislation into different appendices depending on the severity of punitive action. This is particularly interesting given that the initial distance map (of the demand reduction posts) did not identify any themes referring to the CITES regulations, instead only identifying *Wiratno*. Finally, the lack of overlap between the themes was highly apparent within the map, with '*Protected* and *Forest Cat*' and 'P*rotected* and *Know*' having the only overlap.

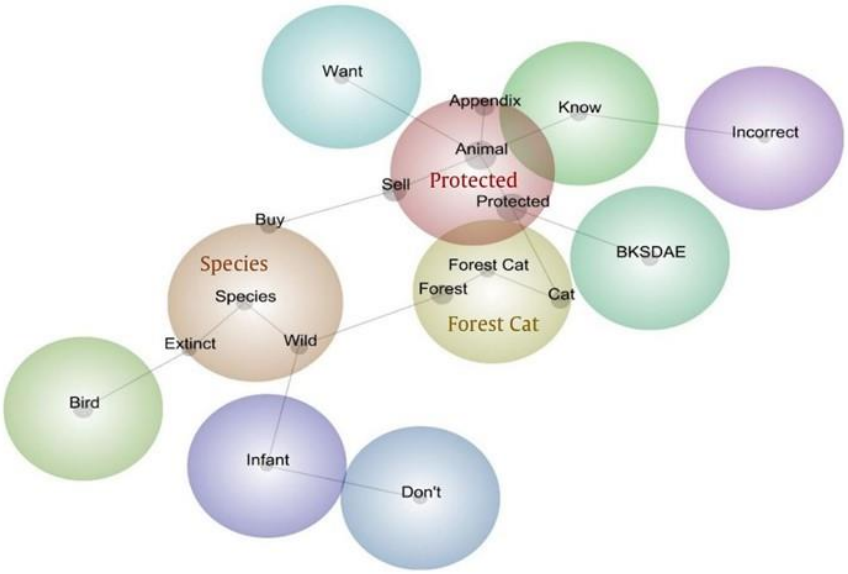

Figure 2. Shows the Leximancer distance map from all response comments.

The *Protected* theme differs in composition to the previous map of the demand reduction posts, encompassing a greater number of concepts, including the terms *Appendix* and *sell*. The *Appendix* concept is associated with the categorisation of species protected by CITES legislation into different appendices depending on the severity of punitive action. This is particularly interesting given that the initial distance map (of the demand reduction posts) did not identify any themes referring to the CITES regulations, instead only identifying *Wiratno*. Finally, the lack of overlap between the themes was highly apparent within the map, with '*Protected* and *Forest Cat*' and 'P*rotected* and *Know*' having the only overlap.

4.3 Motivations, Opportunity and Ability

The Leximancer maps were used to explore the way potential MOA constructs were discussed within the comments and to operationalise them. To explore how these terms were used in context, the prominence values for all paired concepts was downloaded and is presented in Table 1 to further indicate the most frequent terms used in association with our motivation, opportunity and ability variables. Prominence values reflect the co-occurrence between concepts and a value greater than 1.0 suggests that the co-occurrence is more often than by chance and a score of over 3.0 is deemed sufficient to identify compound concepts (Leximancer, 2017; Wilk, Soutar & Harrigan, 2017)

4.3.1 Motivation

Concepts demonstrating the commenters' attitudes towards conservation and their desire to engage in trade behaviours were considered to demonstrate the 'motivation' variable. Initially we intended only to identify terms that indicated motivation to complete pro-conservation behaviours, however the Leximancer output identified both the *Don't* concept as well as three concepts that were determined to represent motivation to continue participating in trade behaviour, *Sell, Buy, Want*. These were included as we consider them to indicate a negative motivation towards conservation action. The prominence values for the concepts most frequently paired with the four 'motivation' terms showed that the term Buy was most frequently paired with *Sell, Bird, Forest Cat, Wild* and *Appendix*; the term *Sell* was most frequently paired with *Buy, Appendix, Species, Animal, Wild, Forest, Cat* and *Forest* Cat, and the term most frequently paired with *Don't* was *Infant* (Table 1). The term *Don't* was also used to express an attitude toward behaviours, as evidenced by the quotes *"don't just sit by and watch as animals are taken from their habitat, fed rice and domesticated"* and *"if you have a pet that's over 2 months old you're less likely to get bloating, don't adopt fresh ones from the forest"*.

The term *want* showed no significant correlation with other terms despite ranking as one of the top concepts. This suggests that use of the term may vary considerably across the comments. Comments were then further explored using quotes from the output to determine in what context these terms were used and to establish the level of variation among the discourse, illustrated by quotes including *"I bought [the animal] to keep it, not to abandon it *smiley emoticon*"*, *"How are you selling Appendix and other protected species?"*, *"Never again buy birds from the market stalls, such as the bar winged prinia, flower pecker bird, sunbirds or other species"* and *"I just said please report it if anyone is selling Appendix animals"*.

4.3.2 Opportunity

Our intention was to include two measures of opportunity within the study model; the length of the post in words and the posters' perception of their own opportunity to carry out the intended action without consequence. As Facebook content is static and not time sensitive, allowing readers to spend as much time as they wish to comprehend the post, the length of the post represents the length of time that the reader has to be influenced or persuaded by the message within the post.

Within the mapping results of the initial demand reduction posts we can see that the term 'criminal' is identified as a key theme, although it is of lower importance to the discussion than many of the other themes. No terms relating to punitive action or legal consequences were found to be concepts or themes within the discussion threads of the comments and therefore we did not use their perception of consequence as a measure of opportunity in Study 2. We did, however, explore the comments themselves through illustrative quotes. We found that some commenters did not believe legal action would reduce their ability to carry out trade behaviours safely, saying *"It all depends on if we react, Uncle, if you think about the purple-throated sunbird, or all species of sunbirds, they've always been protected but in fact there are still many market stalls that sell them"* or encouraging the sale of animals only to trusted people *"Meaning sell it to your family/friends, trading is under the clause (referring to legislation)"*, as well as comments from those who were very concerned by the legal risks such as *"Do not buy an appendix species or keep one as a pet. Sooner or later, the police and local specialists will find out"*.

4.3.3 Ability

Within the 'subjective knowledge' variable, the intention was to establish whether it could be operationalised by differentiating between the knowledge of national regulations, CITES regulations and/or the IUCN threat status of the animals. It is important to reiterate that subjective knowledge only refers to the participant's own belief that they understand the concept, and therefore it was not assessed whether the statements that were made by commenters were accurate or not.

Concept	Protected	Sell	Buy	Want	Know	Appendix	BKSDAE	Incorrect	Species	Animal	Wild	Extinct	Bird	Don't	Infant	Forest	Cat
Sell	2.37																
Buy	1.35	**8.80***															
Want	1.12	2.44	<1														
Know	2.63	1.15	0	2.98													
Appendix	2.47	**4.31***	**3.36***	1.40	1.31												
BKSDAE	2.16	1.57	<1	<1	2.55	2.40											
Incorrect	<1	1.08	0	1.40	2.63	2.47	1.20										
Species	2.10	**3.06***	1.19	<1	1.86	**4.38***	0	1.75									
Animal	**3.60***	**4.19***	2.45	2.38	**4.15***	**5.11***	2.33	1.80	1.70								
Wild	1.15	**3.33***	**3.90***	1.08	**3.05***	<1	1.86	0	**5.42***	<1							
Extinct	1.20	1.75	2.72	1.13	0	1.00	<1	0	**5.67***	1.95	**6.19***						
Bird	1.00	<1	**3.41***	1.07	<1	0	<1	0	**4.45***	<1	**3.88***	**3.05***					
Don't	1.35	<1	1.14	0	<1	<1	1.63	1.68	2.38	1.63	2.60	1.36	1.28				
Infant	1.05	0	0	2.98	0	0	1.28	2.63	**5.59***	1.92	**4.06***	2.13	2.00	**5.36***			
Forest	2.40	**3.14***	1.63	2.72	1.28	1.20	1.75	2.40	1.70	2.63	**3.71***	<1	1.83	2.45	1.28		
Cat	2.40	**3.14***	1.63	1.36	1.92	1.80	1.75	1.20	0	<1	2.79	1.95	<1	<1	0	**5.25***	
Forest Cat	**3.74***	**8.15***	**3.18***	2.65	0	2.34	**4.54***	0	0	2.27	**7.22***	**3.78***	0	0	0	**20.43***	**20.43***

Table 1. Shows the prominence values for all paired concepts in the comment data.

Concepts in bold and marked with an asterisk are significant.

The mapping results showed prominent discussion of CITES international regulations, such as *"At least we already know the rules, as much as possible try not to keep, kill or trade Appendix species and species protected by the law"* and *"Why do they want to make the permissions so complicated? … Whose fault is that?"* as well as discussions about confusion surrounding the KSDAE regulations *"The forest rangers should give us a list of names of all the species that are protected or not, so ordinary people like me know which ones can be kept"*. This contrasts with the demand reduction posts, where the only theme or concept representing a governing body was *Wiratno*, representing the KSDAE.

Initially we considered using three variables to measure the ability construct (i) subjective knowledge of KSDAE regulations, (ii) subjective knowledge of CITES regulations and (iii) subjective knowledge of IUCN regulations. However, the only discussion of IUCN status that appeared within either of Leximancer outputs was the term 'Extinct'(see Figure 2). Therefore, we determined that IUCN threat status was not a useful indicator of subjective ability for our model. As such, we refined our model to include only the subjective knowledge of CITES regulations and KSDAE regulations as indicators of ability.

These data show how discourse analysis of UGC can provide detailed insight into the way that communities respond to demand reduction messages. Through the qualitative analysis of comment data, we identified key concepts that commenters feel are important in their understanding of conservation and wildlife trade laws. While this approach is useful in identifying group patterns, it cannot provide evidence of individual attitude formation or change, thus we also used Study 1 to refine and confirm our variables for a complementary quantitative study. Our variables are as follows: motivation as attitude towards conservation (MacInnis & Jaworski, 1989); opportunity as the post length (Abid, Harrigan & Roy, 2019); and ability as the subjective knowledge of both CITES and KSDAE regulations (Poiesz & Robben, 1996).

5 Study 2

Our second study seeks to assess attitude formation in response to demand reduction messages posted within social media groups that trade wildlife. To do this, we have created an extension of the model that synthesises the traditional central and peripheral processing routes with MOA theory. Specifically, we will assess how the dual routes of information processing and the viewer's existing knowledge, attitudes and values towards conservation and trade influence the valence of comments by consumers, that is UGC, towards the demand reduction posts (Figure 3).

As in ELM, the model considers two routes of information processing, the central and the peripheral route. Central route processing, in this case, involves a cognitive assessment of the quality of the argument presented in the post's text, while the peripheral route consists of cues based on post vividness, popularity and source credibility. Argument quality is one of the most discussed elements of social media message processing and denotes the persuasiveness of the information presented (Teng, Khong & Goh, 2014).

In this study, we define the argument quality of each message as either strong or weak, based upon work by Petty, Cacioppo & Schumann (1983) and Petty & Cacioppo (1984). A weak message is one that may have the same number of arguments as a strong message, but the

arguments are less persuasive, or that includes fewer (strong) brand assertions. Additionally, we posit that emotionally charged messages will tend to be processed via the peripheral route, and those that promote negative mood will reduce the efficacy of message processing (Fu & Chen, 2012; Mundorf, Zillmann, & Drew, 1991).

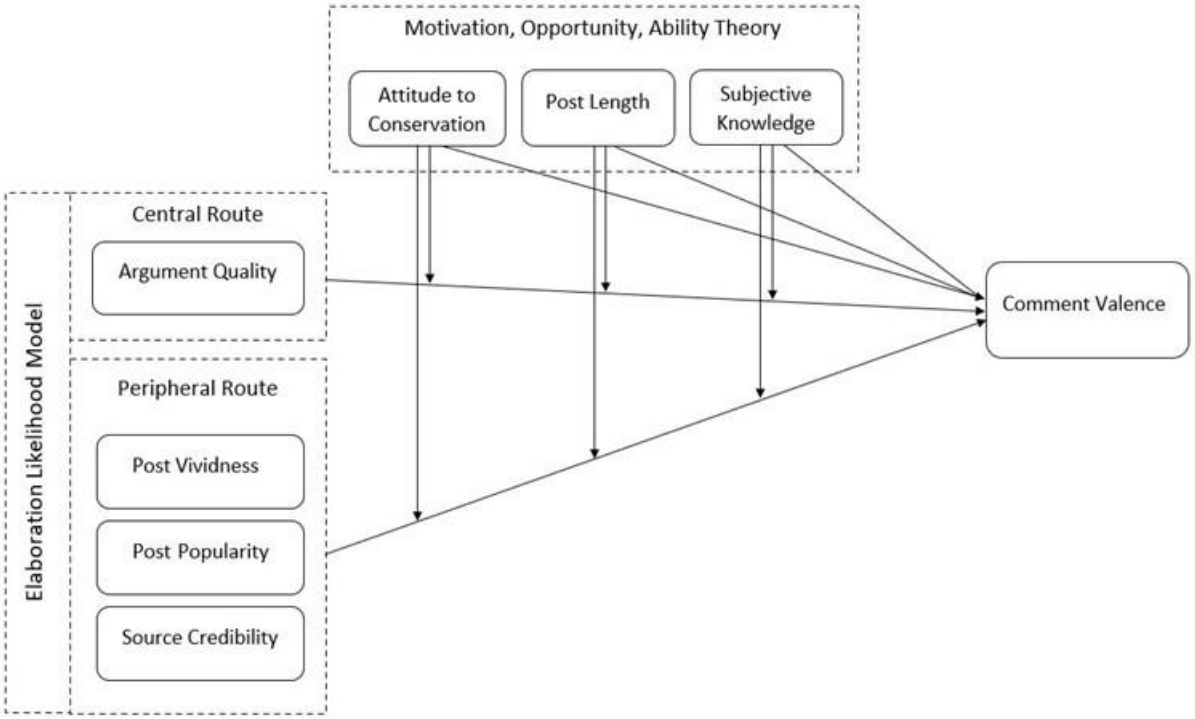

Figure 3. Shows the proposed research model for Study 2

Many peripheral cues have been identified and used in the literature, particularly within the social media context. We have chosen to focus on post vividness, popularity and source credibility. Source credibility has been found to play a critical role where the argument quality cannot be assessed by the viewer or where the messages are deemed irrelevant (Teng, Khong & Goh, 2014). Likewise, post popularity is measured by the number of likes, comments and shares on posts and has been found to be one of the most crucial determinants of post persuasiveness (Chang, Lu & Lin, 2020). Finally, post vividness, used to illustrate post aesthetics, has been shown to influence the preferences of viewers and the endurance of attitude change, particularly on social media (Chang, Yu & Lu, 2015; Coyle & Thorson, 2001; Lin, Swarna & Bruning, 2017). Based on this literature, our first hypotheses are as follows:

H1a – Argument quality will have a positive impact on comment valence.

H1b – Peripheral cues will have a positive impact on comment valence.

5.1 Motivation, Opportunity, Ability Theory constructs

The consumer's motivation is their desire and readiness to complete a behaviour (MacInnis, Moorman, & Jaworski, 1991). Motivation is often conceptualised as 'personal relevance'; in other words, the extent to which the message is seen to 'apply to them' (Bhattacherjee & Sanford, 2006; Pee & Lee, 2016). In our study, commenters who show strong positive or

negative attitude towards conservation are presumed to assess the content as appropriate and relevant to them. Those who have a neutral opinion on conservation are seen to have a low motivation to process and therefore are more likely to process the information via the peripheral route (Tang, Jang & Morrison, 2012). Additionally, those who believe that trade actions benefit conservation (through captive breeding or protection of rare individuals) are seen to have low motivation and those who believe that trade is harmful for conservation are seen to have high motivation. This is predicted to moderate the influence of both the central and peripheral routes as follows:

H2a– Motivation will have a positive influence comment valence.

H2b– Low motivation (i.e., neutral attitude towards conservation) will strengthen the relationship between peripheral cues and comment valence.

H2c– High motivation (i.e., negative or positive attitude towards conservation) will strengthen relationship between argument quality and comment valence.

Post length has been studied previously as a peripheral cue (Teng, Khong & Goh, 2014) and is associated with source style and aesthetics on social media (de Vries, Gensler & Leeflang, 2012), however it is accepted that peripheral cues do not always act solely through the peripheral route (Petty et al., 2004). Additionally, as social media content is not time-restricted, and can be viewed at any time, post exposure cannot accurately be measured as a unit of time. Finally, visible content is replaced as new posts are uploaded to the site and there is a tendency of social media users to consume content very quickly. We therefore suggest that the length of the post is an appropriate metric of 'opportunity'. Therefore, we hypothesise as follows:

H3a – Opportunity (i.e., longer posts) will positively influence comment valence.

H3b – Opportunity (i.e., longer posts) will strengthen the relationship between peripheral cues and comment valence.

H3c – Opportunity (i.e., longer posts) will strengthen the relationship between argument quality and comment valence.

We do not define 'ability' by the commenters' objective knowledge of law and regulation in Indonesia as these regulations and enforcement vary considerably across the archipelago. Nor do we consider their perceived ability to house and care for animals as, in many cases, husbandry is undertaken on a small, ad-hoc scale that requires few resources and does not abide by the welfare standards that a researcher would typically advise. Finally, it would not be suitable to use objective truth as a measure of intent since the commenter can only base their own actions on what they believe to be the case. For these reasons, we determined the most appropriate measure of ability for our study would be the creators' subjective knowledge, in other words, the extent to which the commenter is confident that they know the national and international protections for the species and the impact of trade behaviour on species populations (Poiesz & Robben, 1996). We hypothesise as follows:

H4a – Ability will positively influence comment valence.

H4b – Ability (i.e., subjective knowledge of the legal regulations around trade) will weaken relationship between peripheral cues and comment valence.

H4c – Ability (i.e., subjective knowledge of the legal regulations around trade) will weaken the relationship between argument quality and comment valence.

5.2 Methods

Most variables are coded from posts as two- to three-level categorical variables (see Table 2). Continuous variables, such as popularity and length of the posts, were transformed into three-levels categorical variables based on the 33.3% and 66.6% cut off points. The moderating relationship of Ability was tested as two dimensions, first using the CITES variable and then again using the KSDAE variable to determine any salient differences. A Binary Logistic Regression (BLR) was used to test the main effect in hypothesis 1. Hierarchical Binary Logistic Regressions were used to test the moderation effects in the following hypotheses. All analyses were run in SPSS v25. A regression approach was used to test the moderators because each of the constructs was measured by one item/variable, and the dependent variable is binary. More importantly, it allows researchers to compare the effects before and after adding a moderator (Ro, 2012).

Variables		Code	Results
Dependant Variable			
	Comment Valence (n=188)	3- Agree	Positive (59%)
		2- No opinion	Neutral (0%)
		1- Disagree	Negative (41%)
Independent Variables			
	Argument Quality (n=188)	3- Strong, many	High (72.3%)
		1- Weak, none	Low (27.7%)
	Source Credibility (n=188)	3- Credible	High (42.6%)
		1- No Source	Low (57.4%)
	Vividness (n=188)	3- Video 2- Image	High (62.8%) 0%
		1- Text	Low (37.2%)
	Popularity (n=188)	3- Range (138-4316)	High (40.4%)
	Sum of likes, comments,	2- Range (34-119)	Moderate (27.7%)
	shares	1- Range (5-32)	Low (31.9%)
Moderators			
	Motivation (Cons) (n=164)	0 – Not mentioned	0%
		3 - Positive	Positive attitude (51.8%)
	Attitude towards conservation	2 - Neutral	Neutral attitude (15.9%)
	efforts	1 - Negative	Negative attitude (32.3%)
	Opportunity (Length) (n=155)	3- Range (157-816)	Long (38.7%)
	Total number of words in	2- Range (28-103)	Moderate (25.8%)
	post	1- Range (3-25)	Short (35.5%)
	Ability (CITES) (n=114)	3- High	High knowledge (49.1%)
	Level of subjective knowledge	2- Medium	Moderate knowledge (17.5%)
		1- Low	Low knowledge (33.3%)
	Ability (KSDAE) (n=127)	3- High	High knowledge (52.8%)
	Level of subjective knowledge	2- Medium	Moderate knowledge (17.3%)
		1- Low	Low knowledge (29.9%)
Noise	Comments with emoticons only Comments that did not reflect the topic of conversation Multiple identical comments by a single commenter Comments that only provide an image or link Comments that only tag other accounts Comments that were ambiguous or did not make sense Comments that were unable to be confidently translated by any team members and were assumed to be ambiguous		

Table 2. Descriptive Analysis of Variables

Assumptions (e.g., no outliers, binary dependent variable, little to no multicollinearity issues) for BLR were tested and satisfied (Field, 2009). Please note that the effective sample in the moderation analysis may be smaller than 188 for some constructs, as moderators were coded from posts containing a certain number of 'missing values'. This operation reflects the reality of field data, but we suggest future researchers to include more posts in their analysis of similar data.

5.3 Results and discussion

5.3.1 H1 Test: Dual Routes of Information Processing

The model had a good fit with a significant χ^2 statistic (χ^2 (4) = 10.045, $p<0.05$; Hosmer-Lemeshow $p>0.05$). The model explained between 7.5% (Cox & Snell R^2) and 10.1% (Nagelkerke R^2) of the variance in Comment Valence, and correctly classified 62.2% of cases. As shown in Appendix A, argument quality was negatively related to comment valence (B=-0.621, $p<0.01$). A strong argument was 0.537 times less likely to enhance comment valence than a weak argument. Consistent with the BLR, a cross tab analysis also found that posts that hold a strong argument (52.9%) were less likely to show a positive comment valence than those with a weak argument (75%, χ^2 (1)= 7.569, $p<0.01$). This result is significant but contradictory to H1a, and H1a was not supported. None of the peripheral cues showed significant relationships ($p>0.05$), thus H1b was not supported.

To explain these findings, we draw on psychological reactance theory in which viewers of persuasive messages become aversely psychologically aroused if they feel their freedoms are being diminished (Brehm, 1966; Steindl et al., 2015, Shen, 2015). Previous research in choice-limiting messages for advertising and health communication has indicated that the stronger the level of persuasion, the more psychological pushback the viewer may experience, leading to a distrust of the information and a rejection of the message (Gardner & Leshner, 2016; Weiger, Hammerschmidt & Wetzel, 2018). Commenters may therefore reject demand reduction posts with high argument quality due to a belief that their freedom and autonomy to make their own choices is being curtailed.

In study 1, the differences we observed between the discourse in the demand reduction posts as opposed to the comments, further supports that there remains a disconnect between the message-framing used and its interpretation by group members. Specifically, we found that demand reduction posts predominantly focused upon punitive control measures for reducing wildlife trade, as opposed to ecological or moral arguments for behaviour change. Indeed, rather than providing information that encourages group members to change their attitudes, the posts overwhelming aim to inform them of punitive consequences that limit their ability to carry out behaviours.

We recommend that future research empirically test psychological reactance as a result of individual demand reduction campaigns using the measurement constructs put forth by Dillard and Shen (2005), where reactance theory is fundamentally concerned with specific, context-based behaviours (Miron & Brehm, 2004). We also recommend that future research explore links between wildlife trade and other illicit behaviours, as the intensity of psychological reactance has been linked to the perceived risk of future limitations on associated behaviours (i.e. if they take away one freedom, what stops them taking away others?) (Brehm & Sensenig, 1966).

This is particularly relevant given the literature on reactance restoration, in which viewers of psychologically arousing messages seek to re-assert their control by either performing the restricted behaviour, or illicit behaviours perceived as similar (Quick & Kim, 2009).We therefore recommend that trials take place to determine the most appropriate measures to use for each target audience, as it is likely they may differ according to culture, beliefs and other personality factors (Steindl & Jonas, 2012; Woller, Buboltz & Loveland, 2007).

Our Study 2 results did not support hypothesis 1b, suggesting that there was no significant direct impact of peripheral cues on comment valence. However, our subsequent analyses showed that this was moderated by the MOA dimensions, as discussed below.

5.3.2 H2 Test: Motivation

The moderating effects were tested by a hierarchical BLR analysis. The Hierarchy 1 model had a good fit with a significant χ^2 statistic (χ^2 (5) = 96.44, p<0.001; Hosmer-Lemeshow p>0.05). The model explained between 44.5% (Cox & Snell R^2) and 59.8% (Nagelkerke R^2) of the variance in Comment Valence, and correctly classified 84.1% of cases. As shown in Appendix A, commenters' attitude towards conservation was added to the baseline model as a test of the motivation construct, however this did not change the relationships between argument quality or peripheral cues and comment valences. Motivation itself was positively associated with comment valence (B=2.120, p<0.001). Commenters who were more positive towards conservation were 8.329 times more likely to have a positive comment valence than those who were more negative. Consistent with the BLR, a cross tab analysis also found that more commenters who hold a positive attitude (80%) tend to show a positive comment valence, compared to those who hold a neutral (12%) or negative (7.4%) attitude towards conservation (χ^2 (2)= 79.541, p<0.001). Therefore, H2a was supported.

These findings are in-line with past literature that has demonstrated the link between motivation and attitude formation (Clark, Abela, & Ambler, 2005; Gruen, Osmonbekov & Czaplewski, 2007). It may seem an obvious result that those who hold a positive attitude towards conservation agree with demand reduction posts, however, given the prevalence of behaviours that are antithetical to conservation within the groups - such as animal cruelty, over-harvesting, discussions of illegal consumption of endangered species etc. - it is perhaps a more complicated relationship than it appears. In Study 1, we found that some commenters within multi-species trade groups consider their own actions as pro-environmental, while judging the behaviour of others to be unethical. As an example, it is possible that captive breeders view themselves as morally superior to hunters, pet owners view themselves as morally superior to wild meat consumers etc. On a post detailing the hunting of an orangutan *(Pongo abelii)* in Sumatra, commenters remarked "curse the perpetrator!", "very cruel" and "I hope that the perpetrator receives immediate guidance from God, as no-one can avoid the laws of the creator". However the same commentators later openly remarked about consuming the meat of endemic surilis *(Presbytis spp.)* and selling a southern mitered langur *(Presbytis mitrata)*, listed on Appendix 2 of CITES and deemed Vulnerable to extinction by the IUCN. Therefore, we recommend creating multiple, specific campaigns targeting different trade activities to ensure wide coverage of motivation and beliefs and reduce the perception that the information does not apply to all traders.

The Hierarchy 2 model had a good fit with a significant χ^2 statistic (χ^2 (9) = 105.819, p<0.001, Hosmer-Lemeshow p>0.05). The model explained between 47.5% (Cox & Snell R^2) and 63.9% (Nagelkerke R^2) of the variance in comment valence, and correctly classified 84.1% of cases.

The interaction between vividness and motivation (B=-0.760, p=0.05) and the interaction between popularity and motivation (B=-0.868, p=0.05) were both marginally significant.

Figure 4a shows that a neutral attitude towards conservation strengthens the relationship between vividness and comment valence compared to a negative or positive motivation level. Figure 4b shows that when people held a negative attitude towards conservation, the popularity of the post could lead to a switch towards a positive comment valence. This result is in line with our prediction. However, popularity did not influence people who had a positive attitude towards conservation. More interestingly, when people were less motivated or had a neutral attitude towards conservation, popularity led to a negative comment valence. This result is contradictory to our prediction. These results indicate potential moderations and therefore H2b was partially supported. As shown in Appendices B and F, the moderation on argument quality and comment valence was not significant, therefore, H2c was rejected.

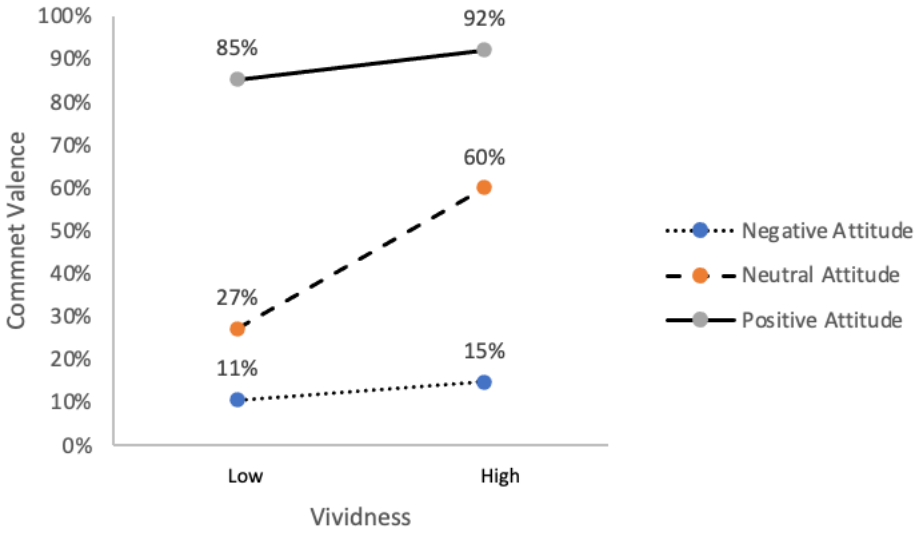

Figure 4a. H2 moderations by motivation: Motivation moderates vividness → comment valence

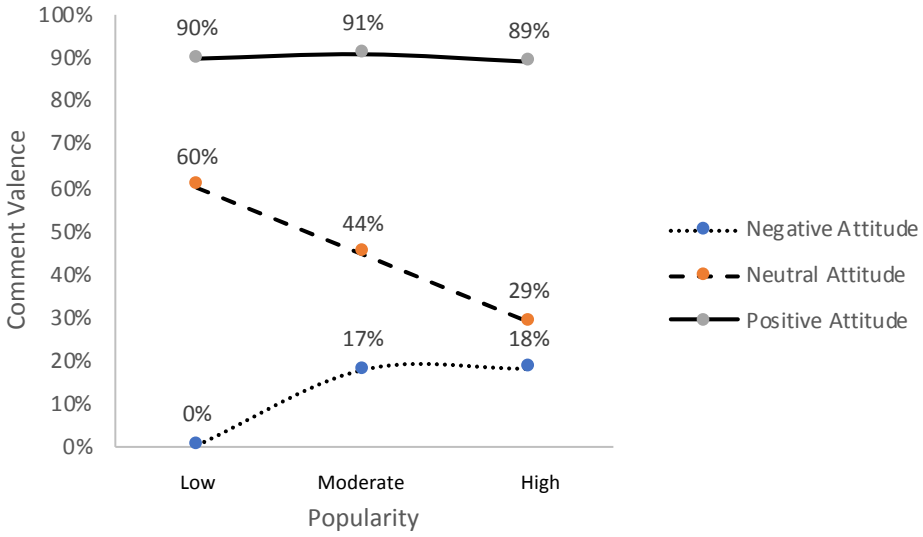

Figure 4b. H2 moderations by motivation: Motivation moderates popularity → comment valence

The moderating effect of motivation on the relationship between peripheral cues and comment valence indicates that when commenters have a low motivation to process information, the impact of vividness is strengthened and becomes significant, with comments becoming more positive in general (H2b). This supports our belief that, under conditions in which the commenter does not have strong opinions on conservation either way, they will look to peripheral cues to assist their information processing (Tang, Jang & Morrison, 2012). This result however was complicated our contradictory findings that an increase in the popularity of the post had a negative impact on comment valence. By contrast, where viewers hold a negative attitude towards conservation, the popularity of the post could lead to positive comments. It is unclear at this stage what may be causing these results, however, the influence of social peers and post popularity has been shown to have a strong influence for social media users generally and in particular for collectivist cultures such as Indonesia (De Vries, Gensler & Leeflang, 2012; Lin, Swarna & Bruning, 2017).

5.3.3 H3 Test: Opportunity

The Hierarchy 1 model did not have a good fit with an insignificant χ^2 statistic (χ^2 (5) = 4.975, p>0.05; Hosmer-Lemeshow p>0.05). The model explained between 3.2% (Cox & Snell R^2) and 4.2% (Nagelkerke R^2) of the variance in comment valence, and correctly classified 61.3% of cases. Source credibility was the only significant factor, after adding post length, i.e. the opportunity to process the message. There was no significant relationship between opportunity and comment valence (p>0.05). Therefore, H3a was not supported.

Outside of controlled experimental design, it is difficult to control the exposure of any commenter to a message in order to increase opportunity. This is particularly true of social media, which is not time-limited and presents information that can be viewed retrospectively (Chu, Kamal & Kim, 2019). It is possible that this structure explains the lack of relationship between the opportunity construct and comment valence.

The Hierarchy 2 model had a good fit with a significant χ^2 statistic (χ^2 (9) = 26.128, p<0.001) and insignificant Hosmer-Lemeshow test statistic (p>0.05). The model explained between 15.5% (Cox & Snell R^2) and 20.8% (Nagelkerke R^2) of the variance in comment valence, and correctly classified 62.6% of cases. As shown in Appendix C, the opportunity (post length) moderated the relationships between source credibility (B=0.917, p<0.01), vividness (B=-0.858, p<0.05), popularity (B=-1.588, p<0.05) and comment valence. Figure 5a shows the positive relationship between source credibility and positive valence only happened when the post was longer. Figure 5b shows the positive relationship between vividness and comment valence only happened when the post was longer. Figure 5c shows the positive relationship between popularity and comment valence only happened when the post was moderate or longer. Therefore, H3b was supported, but H3c was not supported.

Those sharing posts from credible sources should therefore ensure that their posts are no shorter than 157 words long if they want to boost positive comments, while those sharing posts that lack sources deemed credible by the viewers should keep them short. the use of long posts does not appear to strengthen the negative impact of argument quality and therefore, we would predict no harmful effects of using longer posts. Where possible, our findings recommend increasing the length of all posts to at least 28 words. Additionally, it has been found that increasing redundancy of information by repeating key messages can create a greater opportunity for both brand recognition and information processing within the duration of the ad or post (MacInnis, Moorman & Jaworski, 1991).

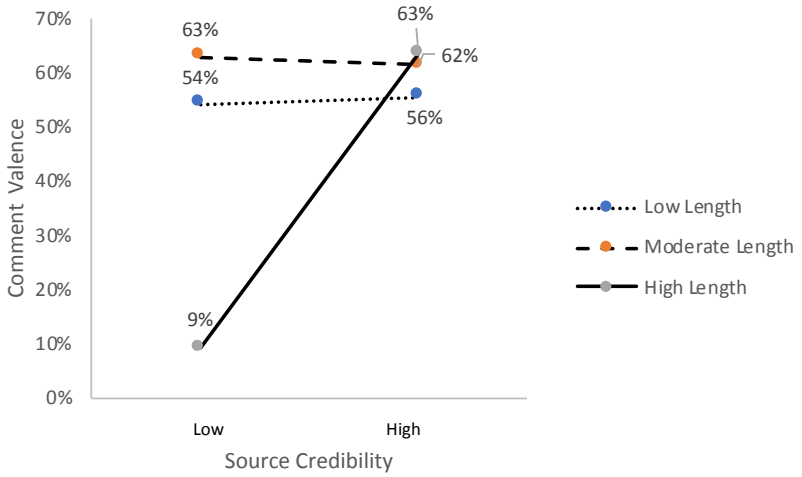

Figure 5a. H3 moderations by opportunity (post length): Opportunity (length) moderates source credibility → comment valence

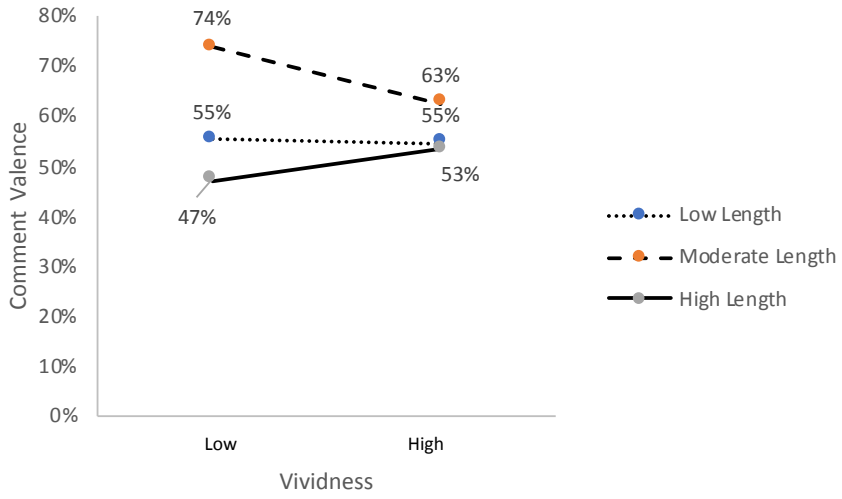

Figure 5b. H3 moderations by opportunity (post length): Opportunity (length) moderates vividness → comment valence

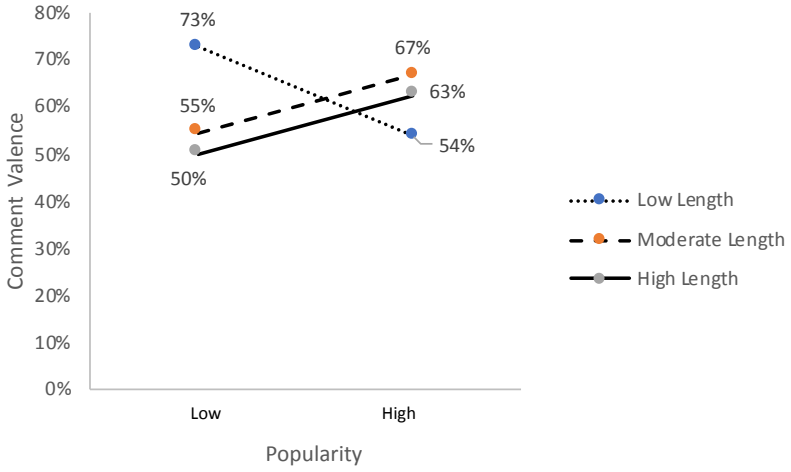

Figure 5c. H3 moderations by opportunity (post length): Opportunity (length) moderates popularity → comment valence

5.3.4 H4 Test: Ability

Although Study 1 found that the 'KSDAE' concept was not as salient in the comments as CITES was, in Study 2, slightly more group members show high level of knowledge in KSDAE laws (52.8%) than CITES laws (49.1%, see Table 2). This finding was unexpected, as it was predicted that wildlife traders' knowledge of the national regulations may have been impacted by the changes to the laws that were occurring in the lead up to data collection, see Section 2.3. In fact, as some of the posts that were included in our study were focused on detailing these new laws, it is possible that this biased our results to suggest the viewers had a greater level of knowledge than in reality due to the fact they were reacting to these informative posts. None of the posts, by contrast, aimed to inform the group members about the correct CITES Appendix list for traded species.

Hypothesis 4 was tested in two formats; knowledge of CITES regulations and knowledge of KSDAE regulations, respectively. The Hierarchy 1 model for Ability (CITES) had a good fit with a significant χ^2 statistic (χ^2 (5) = 32.799, p<0.001; Hosmer-Lemeshow p>0.05). The model explained between 25.0% (Cox & Snell R^2) and 33.4% (Nagelkerke R^2) of the variance in comment valence, and correctly classified 72.8% of cases. As shown in Hierarchy 1 of Appendix D, commenters' knowledge of CITES regulations, or Ability (CITES), was added to the baseline model. Adding this new variable did not change the relationships between argument quality and comment valences, but source credibility became a significant and positive predictor of comment valence (B=0.576, p<0.05). Ability (CITES) increased comment valence (B=1.217, p<0.001). Commenters that had a higher-level Ability (CITES) were 3.337 times more likely to show a positive comment valence than those who had a lower ability. Therefore, when the model was run using the CITES variable, H4a was supported.

The Hierarchy 1 model for Ability (KSDAE) had a good fit with significant χ^2 statistic (χ^2 (5) = 23.849, p<0.001; Hosmer-Lemeshow p>0.05). The model explained between 17.1% (Cox & Snell R2) and 22.8% (Nagelkerke R^2) of the variance in comment valence, and correctly classified 69.3% of cases. As shown in Appendix E, apart from argument quality (B=-0.856, p<001), source credibility (B=0.462, p<0.05) was also a significant factor after adding Ability (KSDAE). In addition, Ability (KSDAE) had a positive main effect on comment valence (B=0.915, p<0.001). Commenters who had a higher-level of knowledge about KSDAE regulations had 2.497 times higher tendency to drive a positive comment valence compared to those who had a lower level of such knowledge. Therefore, when the model was run with the KSDAE variable, H4a was also supported.

This reflects the importance of consumers' ability to process information (in this case subjective knowledge of regulations) in forming their attitudes to demand reduction posts and supports previous research around the moderating role of the ability construct within MOA (Binney, Hall & Oppenheim, 2007; Poiesz & Robben, 1996). This relationship suggests that an increase in education about both national and international regulations would greatly improve the likelihood of viewers to agree with demand reduction posts. Future education campaigns should consider group members' existing perceptions of CITES and KSDAE legislation, law enforcement practices, corruption, and economic opportunity. Simplifying messages to only contain relevant information will improve message clarity and prevent misunderstanding and misrepresentation. For example, education programs explaining the

variance in species nomenclature, in particular across dialects, would ensure group members understand which regulations relate to the species they are likely to encounter in their networks.

As discussed, our findings relate only to subjective knowledge i.e. group members understanding. However, as mentioned above, variation in naming conventions can create ambiguity in species identification. Additionally, there is significant complexity across provincial, national, international and social restrictions on hunting and trade. Therefore, it is likely that there are traders who feel confident that they understand the laws but who are unwittingly engaging in illegal trade behaviours. Therefore, it is critical that education campaigns verify that their audience has accurately interpreted their information and are confident they will be able to recall it in their daily lives.

The Hierarchy 2 model (CITES) had a good fit with a significant χ^2 statistic (χ^2 (9) = 46.969, $p<0.001$; Hosmer-Lemeshow $p>0.05$). The model explained between 33.8% (Cox & Snell R^2) and 45.0% (Nagelkerke R^2) of the variance in comment valence, and correctly classified 78.1% of cases. As shown in Appendix D, while the moderation on source credibility and positive comment valence was not significant, the Ability (CITES) variable moderated the relationships between argument quality (B=-1.151, $p<0.05$), vividness (B=-1.476, $p<0.01$), popularity (B=-1.419, $p<0.01$) and comment valence.

Figure 6a shows both a moderate and high level of Ability (CITES) weaken the positive relationship between vividness and positive valence. Figure 6b shows the positive relationship between popularity and positive valence only occurs when commenters hold a high level of knowledge (CITES). Therefore, when the model was run using the CITES variable, H4b was partially supported. Figure 6c shows a moderate level of Ability (CITES) weakens the negative relationship between argument quality and comment valence, compared to the two extreme low or high level of knowledge. Therefore, when the model was run using the CITES variable, H4c was supported.

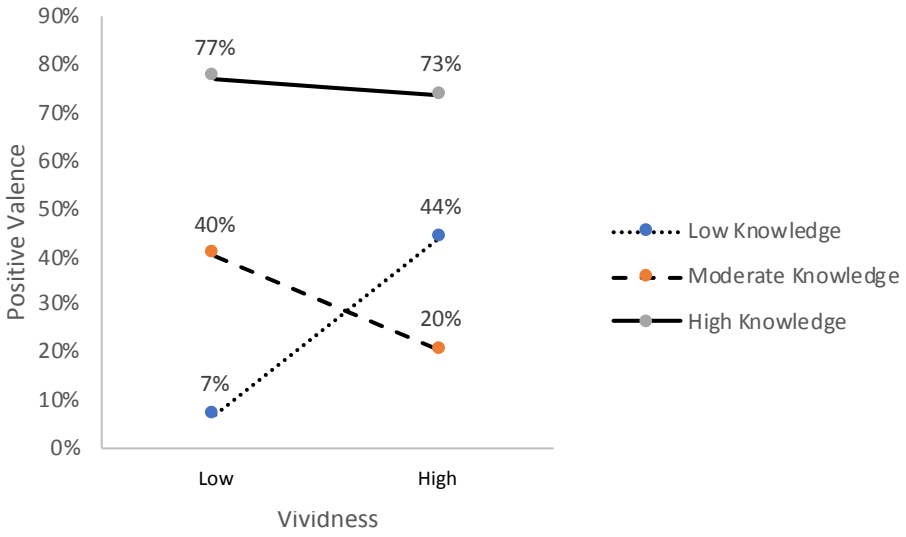

Figure 6a. H4 moderations by Ability (CITES): Ability (CITES) moderates vividness → comment valence

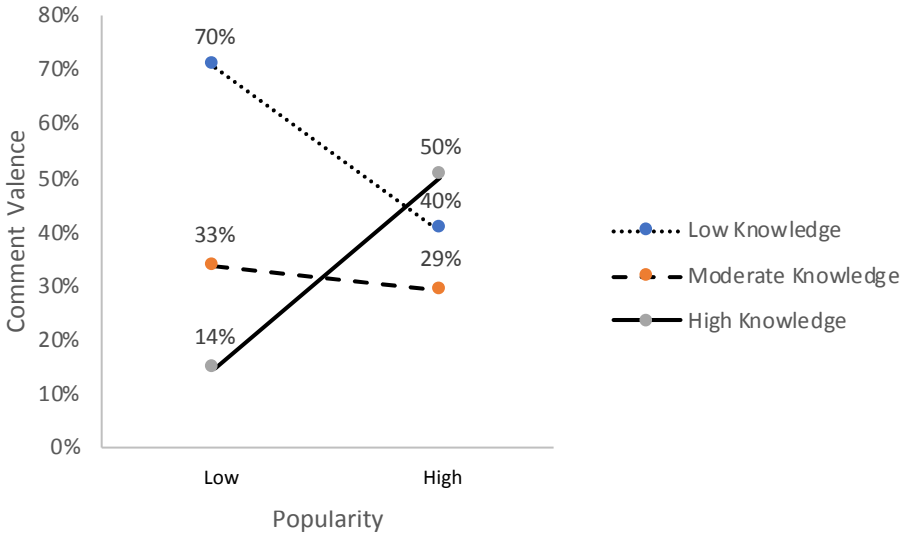

Figure 6b. H4 moderations by Ability (CITES): Ability (CITES) moderates popularity → comment valence

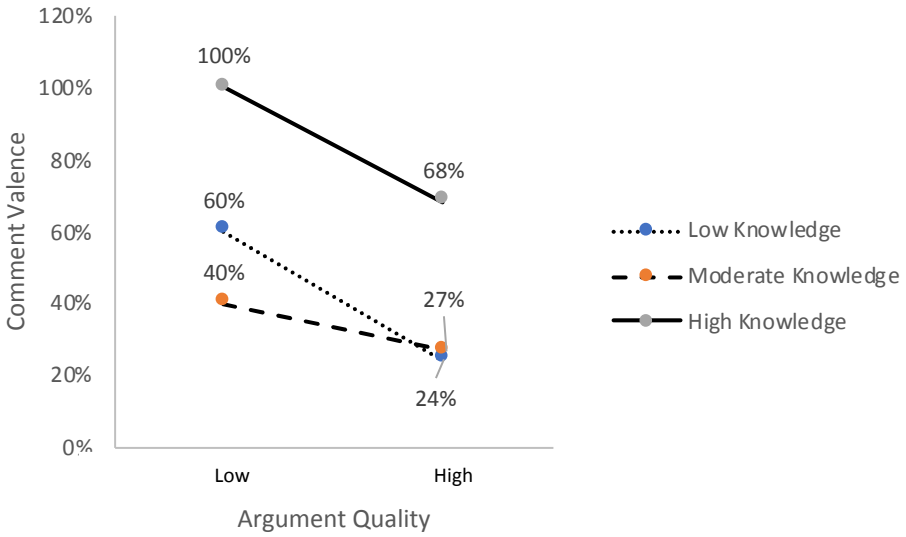

Figure 6c. H4 moderations by Ability (CITES): Ability (CITES) moderates argument quality → comment valence

The Hierarchy 2 model (KSDAE) had a good fit with a significant χ^2 statistic (χ^2 (9) = 29.140, p<0.01; Hosmer-Lemeshow p>0.05). The model explained between 20.5% (Cox & Snell R^2) and 27.4% (Nagelkerke R^2) of the variance in comment valence, and correctly classified 69.3% of cases. As shown in Appendix D, after adding interaction terms, the only significant interaction term was Ability (KSDAE) and argument quality (B=-0.908, p<0.05). The negative relationship between argument quality and comment valence was stronger among people who had a high level of knowledge about KSDAE (Figure 7). Therefore, when the model was run using the KSDAE variable, H4c was partially supported.

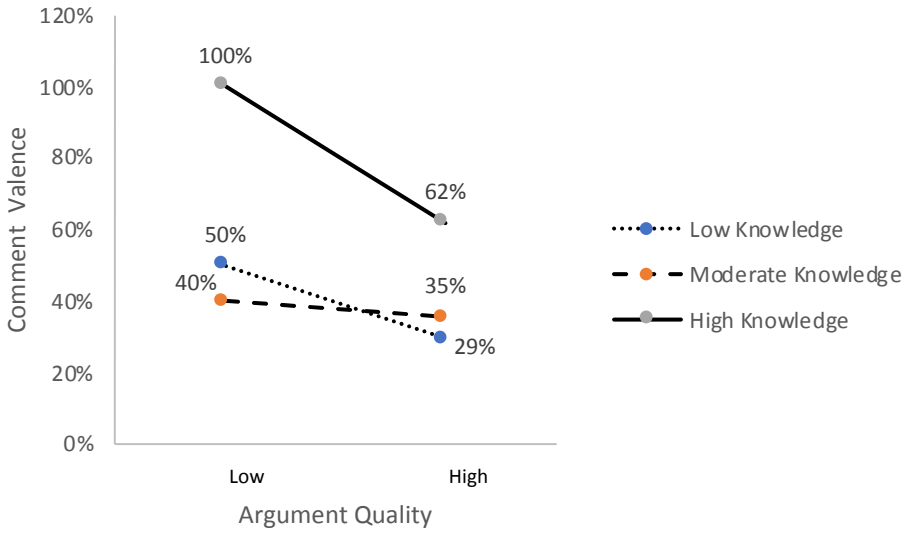

Figure 7. H4 moderations by Ability (BKSDAE)

Our findings support our hypothesis that the strength of the relationship between argument quality and comment valence would be weakened by the Ability dimension but only under conditions were commenters had a moderate level of knowledge about CITES regulations. When knowledge is very low, commenters lack the ability to process information and when knowledge is very high, they experience psychological reactance (Grandpre et al., 2003). If viewers are confident that they are already cognisant of the content presented, they may feel they have no requirement to process additional information, increasing the aversion when they perceive their autonomy or choices are being limited (Spingarn, 1988). The results from the analysis of the knowledge of KSDAE support this theory, as they show that high levels of knowledge about the KSDAE strengthen the negative effect of argument quality, further confirming that high *perceived* knowledge leads to a rejection of the information. In contrast, where viewers had moderate knowledge, they were in a 'psychological Goldilocks' wherein having just the right amount of knowledge or motivation enables them to both process and be persuaded by information.

Where campaigns seek to inform group members on legislation and enforcement, work must be done to ensure that local communities are made fully aware that actions taken are in the best interest of the community, and that punitive measures are enforced fairly and consistently. This would require consultation with local people and law enforcement, ethnographic research, and regular review by species specialists. Additionally, to reduce psychological resistance, practitioners could frame messages to encourage a feeling of similarity and trust in the messenger, as well as suggesting to the viewer that they have a moderate level of knowledge about regulations. For example, messages such as *"Thank you all for teaching me about the BKSDA regulations - were any of you aware that there are harvest quotas for many species that limit the number of animals that can be traded legally?"*.

We found that when viewers had low levels of knowledge of CITES regulations, commenters were attracted by high vividness of posts to provide positive comments, supporting ELM research that suggests that those with low ability to process information tend to be more influenced by peripheral cues (Petty et al., 2004). Conversely, when posts were popular, only group members that had high knowledge of CITES regulations tended to post positive

comments. It is possible that as posts gained likes and comments, group members felt that more eyes were upon them, and there was an increased pressure to conform to social norms. Previous research into environmental messaging has shown a complex relationship between peer comparison, social norms, and personal attitudes when messages are viewed on social media and this effect should not be discounted (Hynes & Wilson, 2016).

Where it is determined that most group members have low subjective knowledge of regulations, posts should be designed with a greater focus on the visual aesthetics and interactivity to gain higher numbers of positively valanced comments. As group members will not process the information via the central route, it will be more efficient to maximise the potential of the peripheral cues to create behaviour change. This can be done by using high quality videos or photos combined with texts and links, as was shown by Yousaf et al. (2020). Our results also suggest that, to be most effective, vivid posts should provide as much opportunity for information processing as possible, either through having long videos or adding large text sections alongside their image content.

7 Implications and conclusion

User-generated content (UGC) in online wildlife trade communities is predominantly dark, in that it promotes the trade of species that are over-harvested, threatened with extinction and treated with poor animal welfare. Across two studies, this research has investigated the impact of demand reduction posts as they attempt to shine a light on these issues within communities. These posts have the potential to lessen the negative impact of consumer engagement, yet globally they remain under-studied and the behavioural responses of trade participants is relatively poorly understood. Consumer behaviours are specific and context-dependent and future research will be able to test our findings in other communities and contexts, in and outside of wildlife trade. To that end, we have carried out an extensive data collection and analysis of big data to draw recommendations for one trade segment: the online wildlife communities for Indonesian species.

Our research synthesises techniques from marketing, information systems and conservation to assess UGC content in online wildlife trade groups. It is therefore uniquely placed to provide insights in all three fields. First, we contribute to consumer engagement research by applying the ELM and MOA theory in parallel to explain the antecedents to, and moderators of, information processing. Combining these two theories has allowed us explain behaviours that have previously not been explored due to the difficulty in accessing and interpreting datasets from traditionally inaccessible communities. Second, we collect big data from current online user communities, operationalising and analysing key theoretical ELM and MOA constructs through real-world UGC, rather than traditional self-report surveys, offering opportunities for future information systems research to replicate and advance our work in other contexts. Specifically, one of our studies applies a novel semantic analysis technique to a large UGC dataset. Finally, this multidisciplinary study should lay the foundation for future research in conservation to draw on information systems and marketing models to explain key behaviours, and information systems and marketing researchers should be encouraged to expand the scope of their engagement research beyond traditional commercial settings.

Practically, we provide advice for conservation practitioners using social media and big data to pay careful attention to both the argument and emotional qualities of their posts, but also to be aware of the specifics around viewer psychology, cultural attitudes around persuasion

and identity and level of knowledge around legal frameworks. As one of the group members from our study eloquently stated *"You have to be self-aware; when changing the mindset of apathetic people who don't want to know, it will be very difficult as their brains and feelings are hard as rocks and they don't want to accept the truth"*.

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References

Abid, A., Harrigan, P., & Roy, S.K. (2019). Online relationship marketing through content creation and curation. Marketing Intelligence & Planning. 38(6), 699-712. DOI:10.1108/MIP-04-2019-0219

Alhabash, S., McAlister, A.R., Quilliam, E.T., Richards, J.I., & Lou, C. (2015). Alcohol's getting a bit more social: When alcohol marketing messages on Facebook increase young adults' intentions to imbibe. Mass Communication and Society, 18(3), 350-375. DOI: 10.1080/15205436.2014.945651

Alvarez-Milán, A., Felix, R., Rauschnabel, P.A., & Hinsch, C. (2018). Strategic customer engagement marketing: A decision making framework. Journal of Business Research, 92, 61-70. DOI: 10.1016/j.jbusres.2018.07.017

Aswani, R., Kar, A.K., & Ilavarasan, P.V. (2019). Experience: Managing Misinformation in Social Media—Insights for Policymakers from Twitter Analytics. Journal of Data and Information Quality (JDIQ), 12(1), 1-18. DOI: 10.1145/3341107

Baccarella, C.V., Wagner, T.F., Kietzmann, J.H., & McCarthy, I.P. (2018). Social media? It's serious! Understanding the dark side of social media. European Management Journal, 36(4), 431-438. DOI: 10.1016/j.emj.2018.07.002

Beckers, S.F., Van Doorn, J., & Verhoef, P.C. (2018). Good, better, engaged? The effect of company-initiated customer engagement behavior on shareholder value. Journal of the Academy of Marketing Science, 46(3), 366-383. DOI: 10.1007/s11747-017-0539-4

Bhattacherjee, A., & Sanford, C. (2006). Influence Processes for Information Technology Acceptance: An Elaboration Likelihood Model. MIS Quarterly, 30(4), 805-825. DOI:10.2307/25148755

Binney, W., Hall, J., & Oppenheim, P. (2007, January). The MOA framework and behavioural response. In ANZMAC 2007: 3Rs, reputation responsibility relevance: Proceedings of the 2007 Australian and New Zealand Marketing Academy conference, 1144-1151. University of Otago, School of Business, Dept. of Marketing. http://hdl.handle.net/10536/DRO/DU:30008150

Blundell, A.G., & Mascia, M.B. (2005). Discrepancies in Reported Levels of International Wildlife Trade. Conservation Biology, 19(6), 2020-2025. DOI:10.1111/j.1523-1739.2005.00253.x

Brehm, J.W. (1966). A theory of psychological reactance. Academic Press.

Brehm, J. W., & Sensenig, J. (1966). Social influence as a function of attempted and implied usurpation of choice. Journal of Personality and Social Psychology, 4(6), 703–707. DOI:10.1037/h0023992

Broad, S. (2020). Wildlife trade, COVID-19 and zoonotic disease risks: shaping the response. Retrieved from https://www.traffic.org/publications/reports/wildlife-trade-covid-19-and-zoonotic-disease-risks-shaping-the-response/

Brodie, R. J., Ilic, A., Juric, B., & Hollebeek, L. (2013). Consumer engagement in a virtual brand community: An exploratory analysis. Journal of business research, 66(1), 105-114. DOI: 10.1016/j.jbusres.2011.07.029

Burkell, J., Fortier, A., Wong, L & Simpson, J (2014) Facebook: public space, or private space?, Information, Communication & Society, 17(8), 974-985, DOI: 10.1080/1369118X.2013.870591

Cacioppo, J. T., & Petty, R. E. (1984). The elaboration likelihood model of persuasion. In NA - Advances in Consumer Research. Eds: Kinnear, T, Provo, UT: Association for Consumer Research, 11, 673-675.

Chang, H., Lu, Y, & Lin, S.C. (2020). An elaboration likelihood model of consumer respond action to facebook second-hand marketplace: Impulsiveness as a moderator. Information & Management, 57(2), 103171. DOI: 10.1016/j.im.2019.103171

Chang, Y, Yu, H., & Lu, H. (2015). Persuasive messages, popularity cohesion, and message diffusion in social media marketing. Journal of Business Research, 68(4), 777-782. DOI:10.1016/j.jbusres.2014.11.027

Chu, S. C., Kamal, S., & Kim, Y. (2019). Re-examining of consumers' responses toward social media advertising and purchase intention toward luxury products from 2013 to 2018: A retrospective commentary. Journal of Global Fashion Marketing, 10(1), 81-92. DOI: 10.1080/20932685.2018.1550008

Clark, B.H., Abela, A.V., & Ambler, T. (2005). Organizational motivation, opportunity and ability to measure marketing performance. Journal of Strategic Marketing, 13(4), 241-259. DOI:10.1080/09652540500338014

Coyle, J.R., & Thorson, E. (2001). The Effects of Progressive Levels of Interactivity and Vividness in Web Marketing Sites. Journal of Advertising, 30(3), 65-77. DOI:10.1080/00913367.2001.10673646

De Vries, L., Gensler, S., & Leeflang, P.S. (2012). Popularity of brand posts on brand fan pages: An investigation of the effects of social media marketing. Journal of interactive marketing, 26(2), 83-91. DOI: 10.1016/j.intmar.2012.01.003

Dillard, J.P., & Shen, L. (2005). On the nature of reactance and its role in persuasive health communication. Communication Monographs, 72(2), 144-168. DOI: 10.1080/03637750500111815

Eigenraam, A.W., Eelen, J., Van Lin, A., & Verlegh, P.W. (2018). A consumer-based taxonomy of digital customer engagement practices. Journal of Interactive Marketing, 44, 102-121. DOI: 10.1016/j.intmar.2018.07.002

Esmail, N., Wintle, B., Athanas, A., Beale, C., Bending, Z., Dai, R., Harrington, L. A. (2019). Emerging illegal wildlife trade issues in 2018: a global horizon scan. Conservation Letters, 13 (4), e12715. DOI:10.1111/conl.12715

Feddema, K., Harrigan, P., Nekaris, K. A. I., & Maghrifani, D. (2020). Consumer engagement behaviors in the online wildlife trade: Implications for conservationists. Psychology & Marketing, 37(12), 1755-1770. DOI:10.1002/mar.21423

Feinstein B., Hershenberg R., Bhatia V., Latack J., Meuwly N. & Davila J. (2013) Negative social comparison on Facebook and depressive symptoms: rumination as a mechanism. Psychology of Poplur Media Culture, 2(3), 161–70. DOI: 10.1037/a0033111

Field, A. (2009). Discovering statistics using SPSS:(and sex and drugs and rock'n'roll). Sage.

Fox, J., & Moreland, J. J. (2015). The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances. Computers in Human Behavior, 45, 168-176. DOI: 10.1016/j.chb.2014.11.083

Fu, J.R., & Chen, J. (2012). An investigation of factors that influence blog advertising effectiveness. International Journal of Electronic Business Management, 10(3), 194-203. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.654.7872&rep=rep1&type=pdf

Gardner, L., & Leshner, G. (2016). The role of narrative and other-referencing in attenuating psychological reactance to diabetes self-care messages. Health Communication, 31(6), 738-751. DOI: 10.1080/10410236.2014.993498

George, C.E., & Scerri, J. (2007). Web 2.0 and User-Generated Content: legal challenges in the new frontier. Journal of Information, Law and Technology, 2. Available at SSRN: https://ssrn.com/abstract=1290715

Gokken, B (2018, 3 August) Indonesia adds hundreds of birds to protected species list, Mongabay News. Article retrieved from: https://news.mongabay.com/2018/08/indonesia-adds-hundreds-of-birds-to-protected-species-list/

Gore, M.L., Knuth, B.A., Scherer, C.W., & Curtis, P.D. (2008). Evaluating a conservation investment designed to reduce human–wildlife conflict. Conservation Letters, 1(3), 136-145. DOI: 10.1111/j.1755-263X.2008.00017.x

Grandpre, J., Alvaro, E. M., Burgoon, M., Miller, C. H., & Hall, J. R. (2003). Adolescent reactance and anti-smoking campaigns: A theoretical approach. Health communication, 15(3), 349-366. DOI: 10.1207/S15327027HC1503_6.

Gruen, T., Osmonbekov, T., & Czaplewski, A. (2005). How e-communities extend the concept of exchange in marketing: An application of the motivation, opportunity, ability (MOA) theory. Marketing Theory, 5(1), 33-49. DOI:10.1177/1470593105049600

Gruen, T., Osmonbekov, T., & Czaplewski, A. (2007). Customer-to-Customer Exchange: Its MOA Antecedents and Its Impact on Value Creation and Loyalty. Journal of the Academy of Marketing Science, 35(4), 537-549. DOI:10.1007/s11747-006-0012-2

Harmeling, C. M., Moffett, J. W., Arnold, M. J., & Carlson, B. D. (2017). Toward a theory of customer engagement marketing. Journal of the Academy of marketing science, 45(3), 312-335. DOI: 10.1007/s11747-016-0509-2

Ho, S.Y., & Bodoff, D. (2014). The effects of Web personalization on user attitude and behavior. MIS Quarterly, 38(2), 497-520. DOI: 10.25300/MISQ/2014/38.2.08

Hogue, J. V., & Mills, J. S. (2019). The effects of active social media engagement with peers on body image in young women. Body Image, 28, 1-5. DOI: 10.1016/j.bodyim.2018.11.002

Hollebeek, D & Chen, T. (2014), "Exploring positively- versus negatively-valenced brand engagement: a conceptual model". Journal of Product & Brand Management, 23(1), 62-74. DOI: 10.1108/JPBM-06-2013-0332

Hynes, N., & Wilson, J. (2016). I do it, but don't tell anyone! Personal values, personal and social norms: Can social media play a role in changing pro-environmental behaviours?. Technological Forecasting and Social Change, 111, 349-359. DOI: 10.1016/j.techfore.2016.06.034

ICEL (2019, 27 November) Revisi Undang Konservasi Sumber Daya Alam Hayati Digulirkan Lagi, Article retrieved from: https://icel.or.id/berita/icel-dalam-berita/revisi-undang-undang-konservasi-sumber-daya-alam-hayati-digulirkan-lagi/

Jacobson, S. K., Morales, N. A., Chen, B., Soodeen, R., Moulton, M. P., & Jain, E. (2018). Love or Loss: Effective message framing to promote environmental conservation. Applied Environmental Education & Communication, 18(3), 252-265. DOI:10.1080/1533015x.2018.1456380

Juric, B., Smith, S., & Wilks, G. (2016). Negative customer brand engagement: An overview of conceptual and blog-based findings. In R. J. Brodie, L. D. Hollebeek, & J. Conduit (Eds.), Customer engagement: Contemporary issues and challenges (pp. 272). Singapore: Routledge.

Kareiva, P., Marvier, M., West, S., & Hornisher, J. (2002). Slow-moving journals hinder conservation efforts. Nature, 420(6911), 15-15. DOI: 10.1038/420015a

Krishnasamy, K., & Stoner, S. (2016). Trading Faces: A Rapid Assessment on the use of Facebook to Trade Wildlife in Peninsular Malaysia. Retrieved from Petaling Jaya, Selangor, Malaysia

Lara-Cabrera, R., Gonzalez-Pardo, A., & Camacho, D. (2019). Statistical analysis of risk assessment factors and metrics to evaluate radicalisation in Twitter. Future Generation Computer Systems, 93, 971-978. DOI: 10.1016/j.future.2017.10.046

Lavorgna, A. (2016). 'How the use of the internet is affecting drug trafficking practices', The internet and drug markets (European Monitoring Centre for Drugs and Drug Addiction: Insights 21, Publications Office of the European Union, Luxembourg. Available from: https://www.emcdda.europa.eu/publications/insights/internet-drug-markets_en

Leung, X. Y., & Bai, B. (2013). How Motivation, Opportunity, and Ability Impact Travelers' Social Media Involvement and Revisit Intention. Journal of Travel & Tourism Marketing, 30(1-2), 58-77. DOI:10.1080/10548408.2013.751211

Leximancer (2017) Leximancer manual version 4.5. Available from http://info.leximancer.com

Li, C.Y. (2013). Persuasive messages on information system acceptance: A theoretical extension of elaboration likelihood model and social influence theory. Computers in Human Behavior, 29(1), 264-275. DOI:10.1016/j.chb.2012.09.003

Lin, H. C., Swarna, H., & Bruning, P. F. (2017). Taking a global view on brand post popularity: Six social media brand post practices for global markets. Business Horizons, 60(5), 621-633. DOI: 10.1016/j.bushor.2017.05.006

MacDonald, E., Milfont, T., & Gavin, M. (2016). Applying the Elaboration Likelihood Model to increase recall of conservation messages and elaboration by zoo visitors. Journal of Sustainable Tourism, 24(6), 866-881. DOI: 10.1080/09669582.2015.1091464

MacInnis, D. & Jaworski, B. (1989). Information processing from advertisements - toward an inegrative framework. Journal of Marketing, 53(4), 1-23. DOI:10.2307/1251376

MacInnis, D., Moorman, C., & Jaworski, B. (1991). Enhancing and Measuring Consumers' Motivation, Opportunity. Journal of Marketing, 55(4), 32-53. DOI:10.2307/1251955

Mackey, T., Kalyanam, J., Klugman, J., Kuzmenko, E., & Gupta, R. (2018). Solution to detect, classify, and report illicit online marketing and sales of controlled substances via Twitter: using machine learning and web forensics to combat digital opioid access. Journal of medical Internet research, 20(4), e10029. DOI: 10.2196/10029.

Martin, R. O., Senni, C., Apos, & Cruze, N. C. (2018). Trade in wild-sourced African grey parrots: Insights via social media. Global Ecology and Conservation, 15, e00429. DOI:10.1016/j.gecco.2018.e00429

Miron, A. M., & Brehm, J. W. (2006). Reactance theory-40 years later. Zeitschrift für Sozialpsychologie, 37(1), 9-18. DOI:10.1024/0044-3514.37.1.9.

Moorhouse, T. P., Balaskas, M., D'Cruze, N. C., & Macdonald, D. W. (2017). Information Could Reduce Consumer Demand for Exotic Pets. Conservation Letters, 10(3), 337-345. DOI:10.1111/conl.12270

Moorhouse, T. P., Coals, P. G. R., D'Cruze, N. C., & Macdonald, D. W. (2020). Reduce or redirect? Which social marketing interventions could influence demand for traditional medicines? Biological Conservation, 242, 108391. DOI:10.1016/j.biocon.2019.108391

Morcatty, T. Q., Feddema, K., Nekaris, K. A. I., & Nijman, V. (In Press). Online trade in wildlife and the lack of response to COVID-19. Environmental Research. DOI:10.1016/j.envres.2020.110439

Mundorf, N., Zillmann, D., & Drew, D. (1991). Effects of disturbing televised events on the acquisition of information from subsequently presented commercials. Journal of Advertising, 20(1), 46–53. DOI: 10.1080/00913367.1991.10673206

Narang, S., Jain, V., & Roy, S. (2012). Effect of QR codes on consumer attitudes. International Journal of Mobile Marketing, 7(2), 52-64. DOI: 10.1177/1847979018812323

Nijman, V. (2010). An overview of international wildlife trade from Southeast Asia. Biodiversity and Conservation, 19(4), 1101-1114. DOI:10.1007/s10531-009-9758-4

Nijman, V., Sari, S. L., Siriwat, P., Sigaud, M., & Nekaris, K. A. (2017). Records of four Critically Endangered songbirds in the markets of Java suggest domestic trade is a major impediment to their conservation. BirdingASIA, 27, 20–25, Available from: https://www.orientalbirdclub.org/birdingasia-27

Nijman, V., Shepherd, C. R., & Sanders, K. L. (2012). Over-exploitation and illegal trade of reptiles in Indonesia. The Herpetological Journal, 22(2), 83-89.

Nijman, V., Spaan, D., Rode-Margono, E. J., Wirdateti, & Nekaris, K. A. I. (2017a). Changes in the primate trade in Indonesian wildlife markets over a 25-year period: Fewer apes and langurs, more macaques, and slow lorises. American Journal of Primatology, 79(11). e22517. DOI:10.1002/ajp.22517

Nuno, A., Blumenthal, J. M., Austin, T. J., Bothwell, J., Ebanks-Petrie, G., Godley, B. J., & Broderick, A. C. (2018). Understanding implications of consumer behavior for wildlife farming and sustainable wildlife trade. Conservation Biology, 32(2), 390-400. DOI:10.1111/cobi.12998

Pearce, K.E. (2015). Democratizing kompromat: The affordances of social media for state-sponsored harassment. Information, Communication & Society, 18(10), 1158-1174. DOI: 10.1080/1369118X.2015.1021705

Pee, L., & Lee, J. (2016). Trust in User-Generated Information on Social Media during Crises : An Elaboration Likelihood Perspective. Asia Pacific Journal of Information Systems, 26, 1-22. DOI:10.14329/apjis.2016.26.1.1

Petty, R., Rucker, D.D, Bizer, G.Y & Cacioppo, J.T (2004) The elaboration likelihood model of persuasion, In Perspectives on Persuasion, Social Influence, and Compliance Gaining. Eds. Seiter, J & Gass, R. Boston, MA: Allyn & Bacon

Petty, R. and Cacioppo, J. (1984), The Effects of Involvement on Responses to Argument Quantity and Quality: Central and Peripheral Routes to Persuasion. Journal of Personality and Social Psychology,46, 69-81. DOI: 10.1037/0022-3514.46.1.69

Petty, R., Cacioppo, J., & Schumann, D. (1983). Central and Peripheral Routes to Advertising Effectiveness: The Moderating Role of Involvement. Journal of Consumer Research (pre-1986), 10(2), 135-146. DOI:10.1086/208954

Phassaraudomsak, M., & Krishnasamy, K. (2018). Trading Faces: A rapid assessment on the use of Facebook to trade wildlife in Thailand. Retrieved from Petaling Jaya, Selangor, Malaysia

Poiesz, T., & Robben, H. (1996). Advertising Effects Under Different Combinations of Motivation, Capacity, and Opportunity to Process Information. in NA - Advances in Consumer Research. Eds. Corfman, K. & Lynch J., Provo, UT: Association for Consumer Research, 23, 231-236.

Quick, B. L., & Kim, D. K. (2009). Examining reactance and reactance restoration with South Korean adolescents: A test of psychological reactance within a collectivist culture. Communication Research, 36(6), 765-782. DOI: 10.1177/0093650290346797

Ranjan, K.R., & Read, S. (2016). Value co-creation: concept and measurement. Journal of the Academy of Marketing Science, 44(3), 290-315. DOI: 10.1007/s11747-014-0397-2

Ro, H. (2012). Moderator and mediator effects in hospitality research. International Journal of Hospitality Management, 31(3), 952-961. DOI: 10.1016/j.ijhm.2011.11.003

Roy, S.K., Balaji, M.S., & Nguyen, B. (2020). Consumer-computer interaction and in-store smart technology (IST) in the retail industry: the role of motivation, opportunity, and ability. Journal of Marketing Management, 36(3-4), 299-333. DOI:10.1080/0267257x.2020.1736130

Schivinski, B., Christodoulides, G., & Dabrowski, D. (2016). Measuring consumers' engagement with brand-related social-media content: Development and validation of a scale that identifies levels of social-media engagement with brands. Journal of Advertising Research, 56(1), 64-80. DOI: 10.2501/JAR-2016-004

Shelton, A. K., & Skalski, P. (2014). Blinded by the light: Illuminating the dark side of social network use through content analysis. Computers in Human Behavior, 33, 339-348. DOI: 10.1016/j.chb.2013.08.017

Shen, L. (2015). Antecedents to psychological reactance: The impact of threat, message frame, and choice. Health communication, 30(10), 975-985. DOI: 10.1080/10410236.2014.910882

Short, C., Rebar, A., Plotnikoff, R., & Vandelanotte, C. (2015). Designing engaging online behaviour change interventions: a proposed model of user engagement. The European Health Psychologist, 17(1), 32-38. Available from: https://www.ehps.net/ehp/index.php/contents/article/view/763

Siriwat, P., Nekaris, K. A. I., & Nijman, V. (2019). The role of the anthropogenic Allee effect in the exotic pet trade on Facebook in Thailand. Journal for Nature Conservation, 51, 125726. DOI: 10.1016/j.jnc.2019.125726

Skålén, P., Aal, K. A., & Edvardsson, B. (2015). Cocreating the Arab spring: Understanding transformation of service systems in contention. Journal of Service Research, 18(3), 250-264. DOI: 10.1177/1094670514559700

Spingarn, J. A (1988) The Pseudo Self-Sufficient Patient. The Psychotherapy Patient, 4(3-4), 111-118, DOI: 10.1300/J358v04n03_11

Steindl, C., & Jonas, E. (2012). What reasons might the other one have?—Perspective taking to reduce psychological reactance in individualists and collectivists. Psychology, 3, 1153-1160. DOI: 10.4236/psych.2012.312A170

Steindl, C., Jonas, E., Sittenthaler, S., Traut-Mattausch, E., & Greenberg, J. (2015). Understanding psychological reactance. Zeitschrift für Psychologie, 223(4), 205-214. DOI: 10.1027/2151-2604/a000222

Tang, L. R., Jang, S. S., & Morrison, A. (2012). Dual-route communication of destination websites. Tourism Management, 33(1), 38-49. DOI: 10.1016/j.tourman.2011.01.021

Teng, S., Khong, K. W., & Goh, W. W. (2014). Conceptualizing Persuasive Messages Using ELM in Social Media. Journal of Internet Commerce, 13(1), 65-87. DOI: 10.1080/15332861.2014.910729

van de Ven, K., & Koenraadt, R. (2017). Exploring the relationship between online buyers and sellers of image and performance enhancing drugs (IPEDs): Quality issues, trust and self-regulation. International Journal of Drug Policy, 50, 48-55. DOI: 10.1016/j.drugpo.2017.09.004

Veríssimo, D., & Wan, A. (2018). Characterizing efforts to reduce consumer demand for wildlife products. Conservation Biology, 33(3), 623-633. DOI: 10.1111/cobi.13227

Vickery, G., & Wunch-Vincent, S. (2007). Web and User-Created Content: Web 2.0, Wikies and Social networking. OECD Publishing, Paris, DOI: 10.1787/9789264037472-en.

Weiger, W. H., Hammerschmidt, M., & Wetzel, H. A. (2018). Don't you dare push me: how persuasive social media tactics shape customer engagement. Journal of the Association for Consumer Research, 3(3), 364-378. DOI: 10.1086/698713

Wilk, V., Soutar, G. N., & Harrigan, P. (2017). Tackling social media data analysis: Comparing and contrasting QSR NVivo and Leximancer. Qualitative Market Research, 22(2), 94-113. DOI: 10.1108/qmr-01-2017-0021

Woller, K. M., Buboltz, W. C., & Loveland, J. M. (2007). Psychological reactance: Examination across age, ethnicity, and gender. The American Journal of Psychology, 15-24. DOI: 10.2307/20445379

Yar, M. (2018). A failure to regulate? The demands and dilemmas of tackling illegal content and behaviour on social media. International Journal of Cybersecurity Intelligence & Cybercrime, 1(1), 5-20. Available at: https://vc.bridgew.edu/ijcic/vol1/iss1/3

Yousaf, A., Amin, I., Jaziri, D., & Mishra, A. (2020). Effect of message orientation/vividness on consumer engagement for travel brands on social networking sites. Journal of Product & Brand Management. Vol. ahead-of-print. DOI: 10.1108/JPBM-08-2019-2546

Appendices

Appendix A. H1 Test Results

DV: Comment Valence		B	Std. Error	Exp(B)	95% CI	Sig.
	Constant	1.616	1.167	5.035		0.083
H1a	Argument Quality	**-0.621**	0.237	0.537	0.337-0.855	**0.005**
H1b	Source Credibility	0.255	0.178	1.290	0.911-1.828	0.076
	Vividness	-0.005	0.197	0.995	0.676-1.463	0.489
	Popularity	-0.078	0.234	0.925	0.585-1.463	0.369

Appendix B. H2 Test Results – Moderation by Motivation

DV: Comment Valence		B	Std. Error	Exp(B)	95%CI	Sig.
Hierarchy 1						
	Argument Quality	**-1.200**	0.637	**0.301**	0.086 - 1.05	**0.030**
	Source Credibility	0.395	0.261	1.484	0.89 - 2.476	0.066
	Vividness	0.321	0.287	1.379	0.786 - 2.418	0.132
	Popularity	0.004	0.328	1.004	0.528 - 1.91	0.495
H2a	Motivation	**2.120**	0.294	**8.329**	4.679 - 14.827	**0.000**
Hierarchy 2						
H2b	Motivation by Source Credibility	-0.436	0.348	0.646	0.327 - 1.279	0.105
	Motivation by Vividness	-0.760	0.471	0.467	0.186 - 1.176	0.053
	Motivation by Popularity	**-0.868**	0.526	**0.420**	0.15 - 1.177	**0.050**
H2c	Motivation by Argument Quality	-0.829	0.559	0.437	0.146 - 1.306	0.069

Appendix C. H3 Test Results – Moderation by Opportunity

DV: Comment Valence		B	Std. Error	Exp(B)	95%CI	Sig.
Hierarchy 1						
	Argument Quality	-0.363	0.271	0.695	0.409 - 1.183	0.090
	Source Credibility	0.386	0.214	1.471	0.967 - 2.239	**0.036**
	Vividness	-0.086	0.234	0.918	0.581 - 1.451	0.357
	Popularity	-0.222	0.322	0.801	0.426 - 1.505	0.245
H3a	Opportunity (Length)	-0.077	0.325	0.925	0.49 - 1.749	0.406
Hierarchy 2						
H3b	Opportunity (Length)by Source Credibility	0.917	0.347	2.502	1.268 - 4.935	**0.004**
	Opportunity (Length)by Vividness	-0.858	0.503	0.424	0.158 - 1.137	**0.044**
	Opportunity (Length) by Popularity	-1.588	0.750	0.204	0.047 - 0.889	**0.017**
H3c	Opportunity (Length) by Argument Quality	-12.038	8125.766	0.000	0 - .	0.500

Appendix D H4 Test Results – Moderation by Ability (CITES)

DV: Comment Valence		B	Std. Error	Exp(B)	95%CI	Sig.
Hierarchy 1						
	Argument Quality	-0.959	0.354	0.383	0.191 - 0.768	**0.004**
	Source Credibility	0.576	0.284	1.778	1.019 - 3.104	**0.022**
	Vividness	-0.038	0.287	0.962	0.548 - 1.69	0.447
	Popularity	-0.299	0.378	0.742	0.354 - 1.555	0.215
H4a	Ability (CITES)	1.217	0.277	3.377	1.96 - 5.817	**0.000**
Hierarchy 2						
H4b	Ability (CITES) by Source Credibility	0.551	0.373	1.735	0.835 - 3.603	0.070
	Ability (CITES) by Vividness	-1.476	0.467	0.229	0.092 - 0.57	**0.001**
	Ability (CITES) by Popularity	-1.419	0.544	0.242	0.083 - 0.703	**0.005**
H4c	Ability (CITES) by Argument Quality	-1.151	0.580	0.316	0.101 - 0.986	**0.024**

Appendix E H4 Test Results – Moderation by Ability (KSDAE)

DV: Comment Valence		B	Std. Error	Exp(B)	95%CI	Sig.
Hierarchy 1						
	Argument Quality	-0.856	0.332	0.425	0.222 - 0.814	**0.005**
	Source Credibility	0.462	0.256	1.587	0.961 - 2.623	**0.036**
	Vividness	-0.110	0.254	0.896	0.544 - 1.474	0.332
	Popularity	-0.302	0.343	0.739	0.377 - 1.448	0.189
H4a	Ability (KSDAE)	0.915	0.240	2.497	1.56 - 3.997	**0.000**
Hierarchy 2						
4b	Ability (KSDAE) by Source Credibility	0.203	0.303	1.225	0.676 - 2.218	0.252
	Ability (KSDAE) by Vividness	-0.542	0.338	0.581	0.3 - 1.127	0.054

	Ability (KSDAE) by Popularity	-0.525	0.439	0.591	0.25 - 1.398	0.116
H4c	Ability (KSDAE) by Argument Quality	-0.908	0.495	0.403	0.153 - 1.064	**0.034**

Appendix F. Shows the effect of moderations on comment valence

		Argument Quality			Vividness			Popularity			Source Credibility		
		Low	High	*Δ*	Low	High	*Δ*	Low	High	*Δ*	Low	High	*Δ*
Moti-vation	Negative				11	15	*4*	0	18	***18***			
	Neutral				27	60	***33***	60	29	***-31***			
	Positive				85	92	*7*	90	89	*-1*			
Opport-unity	Low				55	55	*0*	73	54	***-19***	54	56	*2*
	Moderate				74	63	***-11***	55	67	*12*	63	62	*-1*
	High				47	53	*6*	50	63	*13*	9	63	***54***
Ability (CITES)	Low	60	24	***-36***	7	44	***37***	14	50	***36***			
	Moderate	40	27	*-13*	40	20	***-20***	33	29	*-4*			
	High	100	68	***-32***	77	73	*-4*	70	40	***-30***			
Ability (KSDAE)	Low	50	29	***-21***									
	Moderate	40	35	*-5*									
	High	100	62	***-38***									

This table presents the change in percentage of comments with a positive valence (represented by delta (Δ)) under each condition.

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