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# VISUAL SENSATIONALISATION IN SOCIAL MEDIA THUMBNAILS: A QUANTITATIVE ANALYSIS OF FAKE NEWS PROLIFERATION

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## Abstract

*This research analyzes effects of thumbnail sensationalism on behaviors of social media engagement by stimulus-organism-response (SOR) psychological reactions of Pakistani users. A cross-sectional survey was conducted on 400 urban social media users who had a minimum of 3 hours weekly of platform use. The stratified sample was gender balanced (52% male) and age balanced (18-24, 25-34, 35+ years at 33-34%, 45-33% and 33-33% respectively) and education balanced (secondary 22% and undergraduate 45 and postgraduate 33% respectively).*

*Five hypotheses were tested by hierarchical multiple regression with full model diagnostics showing linearity, homoscedasticity, normality of residuals, and low multicollinearity (VIF <2.1). Thumbnail Sensationalism was a direct predictor of Engagement Behaviors ($\beta$=0.62, $t$=15.42, $R^2$=0.384, $p$<0.001) indicating acknowledgment of manipulative features such as exaggerated faces and clickbait text that lead to clicks, likes, and shares. This was partly mediated by psychological Responses ($\Delta R^2$=0.136, Sobel $z$=8.7, $p$<0.001), and the final model incorporated demographics, which resulted in a final $R^2$=0.56.*

*The greatest effects were observed among YouTube users (M=3.65) sensationalism recognition, compared to Facebook (M=3.28, $\eta^2$=0.12, $p$<0.001). Interaction (between education and effects) was negative (14.2-year schooling threshold: $\beta$=-0.15, $p$=0.016), with secondary-educated users being most vulnerable (14.2-year schooling threshold ($\beta$=0.68) and postgraduates the least (14.2-year schooling threshold $\beta$=0.42).*

*Scales had high psychometrics: Cronbachs alpha ≥0.88 (Sensationalism $\alpha$=0.92), EFA (KMO=0.91) explained 93.2% variance, CR>0.85, AVE>0.50. The results apply SOR to thumbnail ecology, comparing visual manipulation as an autonomous interaction trigger to perform better than normal $R^2$=0.30-0.40.*

*Pakistan validation will fill market gaps that have been created with YouTube at 62% penetration. Practical suggestions are thumbnail authenticity algorithms, pre-upload audits, creator design standards, and digital literacy requirements focused on secondary education (22% low-literacy risk group). The research must be done in India/Bangladesh, using experimental interventions, longitudinal follow-up and cross-cultural test.*

## 1. INTRODUCTION

Facebook, YouTube, Instagram and X are just some examples of social media that have made news consumption a visual, algorithm-based, engaging, but not factual, form of consumption. Content propagation in this context takes place not owing to informational value but rather owing to the emotional and visual appeal (Allcott and Gentzkow, 2017). Algorithms rankings and engagement metrics have substituted traditional gatekeeping practices of editors, putting more risk of misinformation spreading.

Fake news, which is the intentional misrepresentation of a situation and is carried out under the guise of credible journalism, has rapidly expanded online. Although the studies have mostly concentrated on the textual aspect of the news like headlines, there is a lack of research on visual aspects, especially thumbnails, despite the fact that they have a great impact on the choice of the user. Thumbnails are the initial point of interaction and greatly influence the clicking, viewing and sharing of content.

To evoke curiosity, fear or outrage, these images are commonly created with exaggerated images, emotional appeals, and distorted images. These types of strategies coincide with platform algorithms, which promote engagement, where sensational content can go viral regardless of factual accuracy (Covington et al., 2016). This forms a system of thumbnails as a window to both credible and deceitful information.

The emotional signals are interpreted by the interaction of the user with thumbnails into quantifiable interaction like clicks, likes, and shares, which strengthens visibility through algorithms. This is indicative of stimulus-response interaction wherein visual design comes before critical analysis (Bucher, 2012; Kahneman, 2011). With this, platforms end up unintentionally contributing to the propagation of fake news due to the engagement-based systems (Wu, 2016).

### 1.1 What are Fake News and Visual Sensationalism?

Fake news is the invented or manipulated information, which is promoted as a legitimate journalism and transmitted with an appeal to emotions and virality (Allcott and Gentzkow, 2017). It takes advantage of cognitive bias like confirmation bias and heuristic processing (Nickerson, 1998). Although earlier studies revolve around textual misinformation, other visual elements such as thumbnails can also have an effect on engagement.

Thumbnails represent the initial user interface, and in many cases, they are based on sensational design exaggerated expressions, high contrast and misleading images to get a greater number of clicks (Bucher, 2012). The methods separate the world of perception and reality and increase persuasion. Interactive algorithms also enhance this kind of content, focusing on high-performing images (Covington et al., 2016).

When there is a high rate of scrolling through text, users apply the use of fast visual judgments instead of analytical thinking (Kahneman, 2011). Sensational thumbnails capitalize on the System 1 way of thinking and entice impulsive response (Pennycook and Rand, 2019). Confirmation bias also enhances exposure to misinformation that is ideologically biased (Nickerson, 1998). Although it is raising more and more concerns, there is a lack of visual media literacy (Costera Meijer, 2020).

The current research thus investigates the idea of thumbnails as emotionally loaded visual images, which are a source of misinformation via demographic biases and cognitive processes.

### 1.2 The role of the Thumbnails in User Engagement.

Thumbnails are major determinants of activity in the digital environment, affecting clicks, views, shares and comments (Bucher, 2012). QUERA platforms create an incentive to such engagement by rewarding high-performing content using algorithms (Covington et al., 2016), which form feedback loops that reinforce sensational visuals.

Exaggerated emotions, use of bright colors and symbolic cues are design characteristics that elicit quick and intuitive reactions (Kahneman, 2011). The cues trigger System 1 processing, which can often avoid critical evaluation (Pennycook and Rand, 2019). It is further enhanced by the

algorithmic systems that optimize thumbnails by machine learning and A/B testing.

There is empirical evidence of the significant increase in the engagement rate and the rate of spreading misinformation when provocative thumbnails are used (Vosoughi et al., 2018). With time, there is a possibility of normalization of exaggeration, decrease in trust and polarization (Nickerson, 1998). Current solutions, like text-based fact-checking, are insufficient in dealing with the visual influence.

**1.3 Biases in Cognition and Dual Process Theory.**

Users of the digital realm have to work with cognitive overload, and heuristics that are capitalized on by thumbnails. Dual-process theory separates System 1 and System 2 thought processes: fast, emotional thinking that is referred to as System 1 and slow, analytical thinking that is referred to as System 2 (Kahneman, 2011). Use of System 1 is mostly aroused by thumbnails with respect to emotion and sight.

Availability heuristic and confirmation bias are some of the biases that make one more susceptible to sensational material (Tversky and Kahneman, 1973; Nickerson, 1998). Emotional arousal decreases the ability to think analytically and enhances impulsive dissemination (Pennycook and Rand, 2019). Eye-tracking research indicates that the attention by thumbnails takes place in milliseconds (Bucher, 2012).

All these biases are a powerful channel to misinformation, particularly in the circumstances of cognitive overload. The sensational thumbnails are thus effective presuppositions of pre-attention signals that influence the formation of belief and behaviour of sharing.

**1.4 Algorithmic reinforcement of Attention Economy.**

Attention is a scarce commodity that is commercialized by websites in the attention economy (Wu, 2016). Algorithms give priority to the thumbnails that create high engagement which strengthens sensational content (Covington et al., 2016). Machine learning applications constantly improve images according to the patterns of interaction with the user.

This forms feedback loops in which the earlier an engagement is made, the better the visibility it gets and the more content is reached (Marwick and Lewis, 2017). Creators are motivated with economic incentives to maximize thumbnails based on their likelihood of receiving a click as opposed to being accurate (Allcott and Gentzkow, 2017). Such transparency makes users confuse popularity and credibility (Bishop, 2019). This kind of system contributes to the reinforcement of echo chambers and polarization as well (Marino et al., 2024). Recommendation systems are always more concerned about high-arousal content (Zhang et al., 2025), and governance mechanisms are minimal and reactive (Liu, 2025).

**1.5 Problem Statement and Literature Gaps**

The academic discourse on fake news does not focus much on the influence of thumbnails in content proliferation and visual sensations. The existing studies are primarily concerned with text-based factors like headlines, overlooking preview images that shape user choice prior to engaging with content (Lazer et al., 2018; Vosoughi et al., 2018). This is an important gap in thumbnail-driven platforms where visual representations are used to generate clicks and feed off an amplifying algorithm.

The current theories are disjointed: diffusion models do not take visual triggers into account (Rogers, 2003), network theories do not consider visual triggers (Granovetter, 1973), and the spectacle/sensationalism theories are pre-digital in terms of thumbnails (Sparks, 1999; Couldry, 2000). Research on clickbait is based on textual (instead of visual) headlines (Kilgo et al., 2016), whereas cognitive and algorithmic research seldom incorporates dynamics of visual platforms (Kahneman, 2011; Nickerson, 1998; Covington et al., 2016).

There are still empirical gaps in the association of thumbnail features and virality and lack of testing of demographic and literacy-based differences. The majority of interventions are post-hoc fact-checking instead of visual priming.

The paper is filling these gaps by exploring visual sensationalism in thumbnails as a force behind fake news by incorporating dual-process cognition and attention economy with algorithmic reinforcement into a numerical model of how misinformation is disseminated.

**Primary Objective:** Test the causal effect of sensational thumbnails in the fake news engagement/virality of visual-first platforms (Facebook, YouTube, Instagram, X).

**Specific Objectives:**

- Assess effectiveness on essential metrics (clicks, shares, likes, comments).
- Identify visual/emotional cues that motivation.
- Identify psychological mediators (arousal, biases).
- Demographic/psychographic moderators (age, ideology, literacy) of the test.
- Analyze algorithmic amplification.
- Recommend literacy/policy/design strategies.

**Research Questions:**

- What does sensational thumbnail speed up the virality of fake news?
- What are the best characteristics to maximize interest in misleading information?
- What variations in responses are there with user profiles?
- What are the intermediate functions that increase dissemination?
- What platform politics empower/disempower proliferation?

The hypotheses guide the research in this study, which is based on visual communication research, psychology studies, and platform research in order to conduct empirical research on misinformation induced by thumbnails (Allcott and Gentzkow, 2017; Kahneman, 2011). The following part is the section of the Literature Review, which follows the development of the information dissemination, mechanism of fake news, and gaps in visual sensationalism. In the Methodology, a quantitative survey design is given to test a hypothesis. Findings are discussed in Results and Discussion with reference to theory and offer specific interventions.

## 2. Literature review

### 2.1 Information Dissemination and Social Media

How information diffuses is explained by diffusion and network theories. Rogers (2003) mentions innovation, channels of communication, time and social systems whereas Granovetter (1973) mentions weak ties in diffusion. The dissemination has changed into a top-down model, switching to a user-driven network through social media (Boyd and Ellison, 2008), which allows disseminating information (true and false) fast (Lor et al., 2018; Yu et al., 2019). Engaging with the user by sharing and liking elevates reach (Perez-Montoro, 2018; Wolk and Theysohn, 2010), and content that is visually and emotionally captivating is easier to spread (Al-Rawi, 2017; Berger and Milkman, 2012; Kilgo et al., 2016). But, the algorithms may result in the formation of echo chambers and access disparity (Sunstein, 2009; Bondielli et al., 2019), and the visual cues of misinformation dissemination, such as thumbnails, cannot be overlooked (Lazer et al., 2018).

### 2.2 Fake News and Misinformation Dynamics.

False news is a fake information that is posted as a valid journalism and that goes viral on the Internet (Lazer et al., 2018). It becomes viral more than actual news because of emotional resonance (Vosoughi et al., 2018) and is motivated by monetary and ideological agendas (Allcott and Gentzkow, 2017). Big monetized misinformation networks can be demonstrated by the 2016 U.S. election (Subramanian, 2017; Townsend, 2016; Sydell, 2016). Misinformation is further enhanced by weak verification and information overload (Vosoughi et al., 2018; Alessandro et al., 2021; Rovetta and Bhagavathula, 2020). It also leads to distrust and polarization (Figueira et al., 2017). Although such solutions as literacy and platform regulation have been suggested, misinformation still remains (Burkhardt, 2017).

**2.3 What role do Visuals play in Attention Capture?**

Images are perceived more quickly than words and are more attention-grabbing (Fiske and Taylor, 2023). According to the dual-process theory, it is System 1 (fast, emotional) which makes people instantaneously react to the thumbnails (Kahneman, 2011). Attention in the attention economy is scarce and contested (Wu, 2016). Eye-tracking research proves that users look at pictures prior to text (Lazar and Pop, 2021). Although images may enhance learning and even prebunking interventions (Van der Linden et al., 2017), thumbnails in social media tend to misrepresent or simplify information. Little is known about their role in algorithmic engagement (Chung et al., 2012).

**2.4 Thumbnails Sensationalism in the Digital Age.**

Sensationalism is emotional visuals that are exaggerated to heighten interest. Thumbnails are colorful and emotional, containing faces and symbols that create an emotional response and click-bait (Guess et al., 2019). These cues trigger interest and emotional excitement, making them more viral (Van der Linden et al., 2017). Engagement is rewarded in algorithms instead of accuracy (Covington et al., 2016), and visual enhancement increases the spread of fake news (Vosoughi et al., 2018). This is a historical tabloid sensations (Sparks, 1999) and media spectacle theory (Couldry, 2000). Nevertheless, there is little research that focuses on particular aspects of thumbnails such as facial exaggeration or signs of urgency (Kilgo et al., 2016).

**2.5 Tactics of Headlines, Clickbait, and Hype.**

Headlines are used as engagement devices and not summaries. They provoke interest and a sense of urgency, which eye-tracking reveals (Lazar and Pop, 2021). Before reading, interpretation is created by sensational wording (Reiset et al., 2015). They are emotional expression, individualization, and unexpectedness (Kilgo et al., 2016; Makela, 2020). Social media are more trusted by younger audiences (Newman et al., 2022; Lee, 2013) and algorithms continue to advance sensational content (Quan-Haase, 2012). The information presented in clickbait is often distorted, as news are mixed with entertainment (Lischka & Garz, 2021). Communication with thumbnails is not well studied.

**2.6 Digital Era Challenges**

Social media such as Facebook and Twitter provide an opportunity to share information globally quickly (Ahn et al., 2007; Xiang and Gretzel, 2010), altering the trend in the way news is consumed (Silverman, 2015). The engagement-based algorithms, however, do not require content to be accurate, giving preference to the spread of sensational content. Structural diffusion is explained by diffusion theories (Rogers, 2003; Granovetter, 1973), emotional and economic incentives enhance virality (Allcott and Gentzkow, 2017; Vosoughi et al., 2018). Multimodal persuasion is a combination of visual and textual messages (Kilgo et al., 2016; Lazar and Pop, 2021). This sets up a conflict between the process of democratization and manipulation (Burkhardt, 2017).

**2.7 Gaps in the Literature and Research Imperatives.**

Research available does not consider thumbnail-specific sensationalism. The research on diffusion concentrates on macro trends (Rogers, 2003) and the research on fake news focuses on text, not on pictures (Lazer et al., 2018; Vosoughi et al., 2018). Thumbnails on platforms are a topic that is rarely considered in visual cognition studies (Kahneman, 2011; Fiske and Taylor, 2023). The study of clickbait is based on the headlines, but not on visual design (Kilgo et al., 2016). Not many studies associate thumbnail features with outcomes of engagement or demographics. There is limited interdisciplinary integration and interventions are predominantly text-based. This points to the necessity to conduct empirical and quantitative studies on the role of thumbnails as potent sources of misinformation.

## 3. Methodology

### 3.1 Quantitative Approach and Rationale

This paper uses a quantitative research design as the study will explore the connection between visual sensationalism in social media thumbnails and the consumption of fake news. The quantitative approach suits in testing hypothesized relationships by statistically analyzing numerical data to be able to measure clicks, shares and perceived credibility.

Structured data of the perceptions, behaviors and demographic moderators were collected through a survey-based method. The closed-ended questions guarantee the reliability and facilitate the statistical testing (correlation, regression). This paradigm is compatible with positivist paradigm, in which variables are objectively measurable. The independent variables are thumbnail sensationalism (exaggeration, color, emotion) and dependent variables are engagement and virality. The moderators are age, gender, literacy and ideology.

### 3.2 Population and Sampling Strategy.

The target market is the age group of 18+ of social media users in urban Pakistan,that access news through Facebook, YouTube, Instagram, and X, in Lahore, Islamabad, and Karachi. This group is highly digitally penetrated and is pertinent to exposure to misinformation. The stratified multi-cluster sampling method was employed that utilized age, gender, platform preference, and literacy as the strata. Sampling was done in clusters based on geographic (cities) and institutional (universities, offices) units. The number of respondents to be used 400 was determined by the formula of Yamane (95% confidence, 5% margin of error) and the respondents were proportionally distributed among the strata. Cluster random selection made clusters representativeness and minimized bias.

### 3.3 Instrument Development (Questionnaire)

A 5-point Likert scale, 40-item questionnaire was created. It comprised: thumbnail sensationalism (15 items), engagement behaviors (10 items), psychological responses (10 items) and moderators (5 items). The items used were based on literature, vetted by three specialists, and narrowed down to 40 items. Clarity and reliability ($\alpha$=0.82) were confirmed using a pilot study (n = 50). The instrument has eligibility screening, exposure recall, behavior and psychological items and demographics. It was provided in Urdu and English through Google Forms and paper version. Reverse coded questions minimized bias on responses.

### 3.4 Data Collection Procedure

The field teams were trained and used to collect data in the four weeks (March 2025) in Lahore, Islamabad, and Karachi. The sampling design was used to select the respondents randomly in campuses and malls. Participants were informed, provided oral consent and were assured of confidentiality. The non-English speakers were supported by bilingual facilitators. Tablets were used to collect data which was digitized on a daily basis. Among 450 responses 400 valid responses were kept (82% response rate). Duplicates and outliers were removed and screened in quality checks. Voluntary participation, anonymity and protection of data were guaranteed through ethical procedures.

### 3.5 Reliability and Validity Assessment

Cronbach alpha (≥0.70) was used to check the reliability and the item total correlation and alpha-if-item-deleted analysis. Validity consisted of expert content validation, construct validity through exploratory factor analysis and factorability (KMO and Bartletts test). Loadings of > 0.50 were needed to determine convergent validity and low cross-correlations were used to determine discriminant validity. A pilot study was done, which implied a prior refinement and bilingual equivalence.

### 3.6 Data Analysis Techniques

Data analysis was done using SPSS 27. Demographics and trends were summarised using descriptive statistics. Pearson correlation was used to test the relationships between variables. Hierarchical regression was used to test hypotheses, such as moderation. ANOVA and ANCOVA were used to evaluate the differences

between groups on different platforms and demographics, with post-hoc tests. Shapiro Wilk, Levene test and VIF were used to test the assumptions (normality, homoscedasticity, multicollinearity). The effect sizes ($\eta^2$, $f^2$) and significance level ($p < 0.05$) were provided. Adequacy was verified with power analysis of medium effects at 95% confidence.

### 3.7 Limitations and Ethical Protocols.

An Institutional Review Board was used to get ethical approval. There was informed consent, anonymity and right to withdraw. No vulnerable groups and no minors were involved and data was safely encrypted. Results will be made public. There are limitations of self-report bias, cross-sectional (no causality) design, and sampling, which is restricted to urban areas. Experimental, longitudinal, multi-method studies are recommended to enhance validity and ecological accuracy in future studies.

## 4. Results

### 4.1 Sample Characteristics and Descriptive Statistics

The chapter contains demographical information and variables distribution to illustrate the preparedness to analyze. Descriptive statistics are used to measure the central tendency and variability and this can assist in deciding whether data can be used to make a statistical inference such as regression.

**Participant Description:** Out of 450 participants, 400 fulfilled the criteria for participation (>3 hours usage per week on social media). Details of composition are shown in Table below.

Equal proportionality was maintained in terms of gender with males comprising 52% (n=208) and females 48% (n=192). Participants were categorized according to age into three equal segments – 18-24 years (33%, n=132), 25-34 years (34%, n=136), 35+ years (33%, n=132). This strategy helps assess interaction on platform specific to age cohort in future moderation.

Participants had secondary education (22%, n=88), university degrees (45%, n=180) and post-graduates (33%, n=132). YouTube (62%, n=248), Facebook (52%, n=208), Instagram (41%, n=164), and X (28%, n=112) were the most popular platforms. Standardised access for urban sourcing in Lahore, Islamabad, and Karachi.

**Variable Distributions**

Mean values and standard deviation of Thumbnail Sensationalism (15 items, 5-point scale) were M=3.42, SD=0.87, which pointed to moderate-high detection. Engagement Behaviours (10 items) were regular patterns of clicking/liking with a score of M=3.31, SD=0.92. The psychological responses (10 items) showed a preponderance of arousal (M=3.25, SD=0.89). Effect universality is confirmed by means above the scale midpoint (3.0) using one-sample t-tests ($p<0.001$ each), laying the groundwork for relational analysis. The assumptions of parameters are checked when it is assumed that it is normal (skewness <1.5, kurtosis <2.0).Owing to the preparation of data to maintain test power, list wise elimination of outliers ($z>\pm3.29$ univariate, Mahalanobis multivariate) amounting to 2% were removed. The missingness (1.4%) was imputed by means and had a random distribution (MCAR p=0.42 by little). The techniques minimize bias without affecting n=400.

### 4.2 Reliability and Scale Validation

To guarantee consistency of the measurements and minimise bias in the regression estimations as a result of the measurement error, scale reliability was first compared before the correlation analysis. Cronbach alpha was used to test internal consistency, with a value greater than 0.80 being considered an excellent reliability. Each construct was very reliable.

The Sensationalism scale (15 items) demonstrated high reliability ($\alpha = 0.92$) as well as the item-total correlation ranged between 0.58 and 0.81 which are above the acceptable limit of 0.30. Engagement Behavior (10 items) was also high in reliability ($\alpha = 0.89$; item-total correlations = 0.62–0.84) and Psychological Responses (10 items) was high in reliability ($\alpha = 0.88$ with item-total correlations between 0.59 and 0.82).

The analysis of item deletion showed that the deletion of any item would enhance alpha by less than 0.02; hence, all items were included to maintain content validity. Principal axis factoring with pro max rotation, which was used in exploratory factor analysis, ensured the appropriateness of the data (KMO = 0.91; Bartlett's test $\chi^2 = 4523.4$, $p < 0.001$).

Three factors were identified that accounted 93.2 % of the overall variance with factor loading above 0.60 and cross loading below 0.30. All constructs had a composite reliability of more than 0.85. AVE values greater than 0.50 were used to confirm convergent validity whereas HTMT ratios less than 0.85 were used to confirm discriminant validity. Altogether, these findings prove that the psychometric validity is high, which guarantees that hypotheses are statistically tested without measurement bias.

**4.3 Correlation Analysis**

Prior to multivariate modeling, correlation analysis was done to test bivariate relationships with Pearson r. Correlations above 0.50 were deemed to be meaningful and multicollinearity was evaluated at 0.80. Findings revealed that Thumbnail Sensationalism was strongly related with Engagement Behaviours ($r = 0.62$, $p < 0.001$) and Psychological Responses ($r = 0.58$, $p < 0.001$). The highest correlation was between Engagement Behaviours and Psychological Responses ($r = 0.71$, $p < 0.001$). There were no multicollinearity problems because there was no correlation more than 0.80.

These results correspond with the Stimulus-Organism-Response theory in which sensationalism is a stimulus that creates a psychological response which then leads to engagement behavior. All correlations were found to be statistically significant with 398 degrees of freedom. The effect sizes were in line with what Cohen has recommended, where $r = 0.62$ is seen as a strong relationship. The general correlation pattern confirms a linear model of sensationalism to psychological response to engagement to give an empirical foundation to mediation analysis.

**4.4 Hypothesis Testing (Regression Results)**

Hypotheses were tested through hierarchical multiple regression by adding variables in blocks and looking at differences in explained variance ($\Delta R^2$) and overall fit ($R^2$) and standardized effects ($\beta$) and unstandardized coefficients ( B ). The assumptions of the models were validated (linearity, homoscedasticity, normality, low multicollinearity: VIF < 5; Durbin–Watson = 1.98).

H1 was supported as the baseline model revealed that Thumbnail Sensationalism was a strong predictor of Engagement Behaviors ($\beta = 0.62$, $t = 15.42$, $p < 0.001$; $R^2 = 0.384$). The inclusion of Psychological Responses raised the explained variance to $R^2 = 0.52$ ($\Delta R^2 = 0.136$, $p < 0.001$) and both Sensationalism ($\beta = 0.41$) and Responses ($\beta = 0.45$) were significant. Partial mediation was confirmed ($z = 8.7$, $p < 0.001$), supporting H2.

Demographics added a small positive contribution to the model (final $R^2 = 0.56$), but age had a small negative impact ($\beta = -0.12$, $p < 0.05$), whereas core predictors were unchanged (Sensationalism $\beta = 0.39$; Responses $\beta = 0.42$). H3 and H4 were justified as well with a significant impact of Sensationalism on Responses (($\beta = 0.58$, $p < 0.001$) and platform differences (YouTube $\beta = 0.65$ vs. Facebook $\beta = 0.49$, $p < 0.01$). The test of H5 is in the following section.

The diagnostic tests proved model robustness (Breusch–Pagan $p = 0.41$; Shapiro–Wilk $p = 0.12$) and bootstrapping (5000 resamples) demonstrated the stability of the coefficients. On the whole, the emotional mechanisms were found to explain a significant part of engagement variation (39-62%), which validates the suggested SOR framework.

**4.5 Moderation Analysis**

Hierarchical regression with mean-centered interaction terms (predictor × moderator) was used to conduct moderation analysis to determine whether contextual factors moderate the strength or direction of effects. Significant interaction terms denote the condition of the

boundary where relationships are stronger and weaker.

In the moderation of education (H5), the thumbnail sensationalism interaction and education were also significant (β = −0.15, p = 0.016), and the interaction contributed to the further 2.3% variance. The strongest effects were between secondary-educated respondents (β= 0.68) and the lowest between postgraduates (β = 0.42), which is in line with the Elaboration Likelihood Model, in which increased literacy enhances central processing and diminishes the vulnerability to visual persuasion.

YouTube also had substantial platform moderation ((β = 0.19, p = 0.004, $\Delta R^2$ = 0.028) and YouTube (β = 0.65) more than other platforms (β = 0.46), which could be attributed to its highly visual interface. There was no strong age moderation (β = −0.08, p = 0.182), indicating that there were no strong differences in the effects by age.

The Johnson Neyman method has found out that the threshold of schooling is 14.2 years above which the effects are not as strong. The model robustness (no heteroscedasticity: p = 0.37; normality: p = 0.09) was confirmed through diagnostic tests, with bootstrapped confidence intervals confirming the education interaction (95% CI [−0.27, −0.04]).

Education and platform, in general, proved to be important moderators, where literacy was a protective factor, and effects were enhanced by YouTube design, whereas age did not play a significant role.

### 4.6 Platform and Demographic Comparisons

ANOVA and ANCOVA comparative analysis were used to determine the subgroup differences and control the variables that are significant. Pair-wise differences ($p < 0.05$) were detected by post-hoc Tukey HSD tests and the effect size was estimated with eta-squared ($\eta^2 > 0.06$ indicating moderate effects).

Comparison of platforms indicated that the perceived thumbnail sensationalism was reported highest on YouTube (M = 3.65, SD = 0.82), significantly higher than Facebook (M = 3.28, p = 0.002), Instagram (M = 3.41, p = 0.031) and X (M = 3.22, $p < 0.001$), with Engagement behaviors were also of the same pattern and YouTube was top (M = 3.52, SD = 0.88) followed by Facebook (M = 3.19, p = 0.001). ANCOVA validated these differences did not diminish when sensationalism was accounted in ($F = 14.2$, $p < 0.001$).

Age showed no significant overall effect (F = 1.84, p = 0.161), although users aged 18–24 were more engaged (M = 3.48) than those above 35 (M = 3.15; p = 0.008, $\eta^2 = 0.08$). The greatest variation was in education, with secondary-educated users also reporting higher engagement (M = 3.61) than postgraduates (M = 2.95), which was also confirmed by ANCOVA ($F = 16.7$, $p < 0.001$, $\eta^2 = 0.14$). There were no significant differences based on gender (p = 0.214). The commitment was also greater in urban users (M = 3.47) compared to peripheral users (M = 3.21; p = 0.012).

In general, platform design, especially thumbnails grid designs, proved to be a major influence of visual competition and interaction. Education was the most powerful demographic differentiator, with literacy being a major buffer against the effects of sensationalism.

## 5. Discussions

### 5.1 Overview of Key Findings

This chapter explains the empirical evidence in the frames of the Stimulus-Organism-Response (SOR) framework, showing how the behavior of engagement in Pakistani social media users is influenced by thumbnail sensationalism on the basis of the psychology of the people. Using a cross-sectional survey of 400 participants, the five hypotheses were all proved correct, which proved that there is a strong SOR model of visual persuasion in the circumstances of limited attention.

The biggest predictor of engagement was the thumbnail sensationalism (β = 0.62, $R^2 = 0.384$). To a large extent, psychological reactions mediated this relationship ($\Delta R^2 = 0.136$; Sobel z = 8.7), which validated their importance in the interpretation of visual stimuli to behavioral results. Mean scores were moderate-to-high exposure and response levels: sensationalism recognition (M = 3.42), engagement behaviors (M

= 3.31), and psychological arousal (M = 3.25), which is consistent with global literature on clickbait. The Pakistani context has 62 % of respondents who reported to spend above three hours on YouTube per week.

Platform effects differed considerably, with the users of YouTube being more sensitive to sensationalism (M = 3.65, $\eta^2$ = 0.25) than Facebook users (M = 3.28, $\eta^2$ = 0.12) probably because of the algorithmic and grid-based thumbnails. Education also had a significant moderating effect ($\beta$ = −0.15), and more so between secondary-educated users ($\beta$ = 0.68) than postgraduates ($\beta$ = 0.42), which is in line with the Elaboration Likelihood Model: less literate users utilize more peripheral visual information, whereas more literate users use more central processing. There were no significant moderating effects on age and gender meaning that the findings can be widely applied to demographic populations.

The last model had a high explanatory power ($R^2$ = 0.56), being better than traditional SOR studies ($R^2$ = 0.30–0.40) and to explain more than half of engagement variance. The results were robust with high reliability ($\alpha \geq 0.88$), and no multicollinearity (VIF < 2.1), and satisfactory normality assumptions. The results emphasize the ways in which the digital environment in Pakistan (62% urban penetration of YouTube and different literacy levels) exposes users with lower levels of education to risks, as they constitute about 22 %of the sample.

On the whole, this research extrapolates SOR theory to the realm of thumbnail-based visual ecology, which places literacy as one of the protective variables and focuses on risk configurations defined by platforms. Theoretical contributions, policy implications and limitations are covered in the other sections.

### 5.2 Theoretical Implications

This paragraph shows how the results contribute to the body of literature and enhance theoretical frameworks by incorporating digital thumbnails in the Stimulus–Organism-Response (SOR) model. In contrast to the conventional SOR studies which involved the design of websites or advertisements, this study demonstrates that micro-level visual stimuli in thumbnails (e.g., facial exaggeration and clickbait images) can be effective stimuli that influence psychological conditions and engagement behaviour.

The interaction between attention economy theory and digital marketing is that Thumbnail Sensationalism is a strong predictor of Engagement Behaviors ($\beta$ = 0.62). In contrast to previous works on clickbait that included text, this work demonstrates that both the visual stimuli and emotional bias are triggered by visual stimuli, and the mediation between the two is partially supported ( $\Delta R^2$ = 0.136 ), which supports the stimulus organism relationship.

The model is further refined by platform differences, where YouTube exhibits greater effects ($\eta^2$ = 0.12) as it has a visual grid-based structure, which aligns with the affordance theory. The educational moderation ($\beta$ = −0.15) is in line with the Elaboration Likelihood Model, in which less-literate users have to be guided by the visuals whereas more-literate users analyze the content in a more critical way. The 14.2 year educational attainment threshold explains the difference in vulnerability.

The model has a high explanatory power ($R^2$ = 0.56) which is beyond the traditional SOR standards (0.30 0.40) and a high level of reliability ($\alpha \geq 0.88$). Results also affirm the Western paradigms of digital behavior to be applicable in Pakistan, where cultural influences probably compound the processing of visual emotion.

In general, thumbnails are restructured as major theoretical drivers of digital persuasion. The model has a high predictive capacity of the platform and interventions, and it is recommended that future studies be conducted to validate longitudinal and cross-cultural impacts.

### 5.3 Practical and Policy Recommendations

This section offers platforms, creators, regulators and users with viable tactics that are grounded on empirically found results. Since it has a 38.4% variance explained in engagement behaviors, the validated thumbnail sensationalism pathway with

β=0.62needs to be highly mitigated. Since the influence of YouTube was most important with $\eta^2$=0.12, this is mostly due to platforms.

**Platform Design Interventions:** To decrease visual manipulation, social media platforms should bring in thumbnail authenticity scoring. The exaggerated faces, arrows, and clickbaits can be identified by AI-based systems whereas YouTube might demand pre-upload audits because of the more significant grid-based effects of engagement (β= 0.19). This particularly applies to YouTube (M = 3.65) than Facebook/Instagram (M = 3.28), as it means that more stringent requirements on sensationalism of thumbnails are necessary.

**Content creator policies and rewards:** Publishers must have transparent design principles, and websites must post guidelines on acceptable and unacceptable thresholds and examples of acceptable and sensational thumbnails. Neutral, descriptive visuals and good compliance to video content should be utilized in compliant thumbnails. The high-compliance channels may be rewarded with an algorithmic boost that will place more emphasis on actual engagement rather than click-based metrics. Since the penetration rate of YouTube in Pakistan is 62% localized (Urdu-based) standards are proposed, specifically among creators in big city centres like Lahore, Islamabad, and Karachi.

**The regulatory policies** need to involve the inclusion of digital literacy in the national curriculum of Pakistan as a part of the Pakistan Telecommunication Authority. Education serves as a modifying variable, and one of the major break points is 14.2 years (β = −0.15). Thumbnail literacy programs aimed at identifying the deficiencies in curiosity and emotional manipulation (especially the low-literacy groups (22%), the most vulnerable group should be implemented in secondary schools (β = 0.68).

**The tools of user empowering** may be the use of browser-based warnings concerning sensational thumbnails and AI-based clickbait detection systems. To minimize the influence of algorithms, platforms can also provide optional chronological feeds. Platform hygiene training must also be incorporated in organization as age effects are universal.

**On the industry level**, a Digital Marketing Association of Pakistan may implement a certification of thumbnail ethics, where ethically appropriate content is awarded the trust badges. Regular audits have an opportunity to benchmark industry standards with the help of such metrics as sensationalism recognition (M = 3.42).

It can be implemented according to a priority scheme: technological solutions in 6 months, curriculum changes in 2-5 years, and the immediate implementation of user tools through app stores. All these strategies are aimed at minimizing manipulation and balancing the engagement economics, with digital literacy being the most cost-effective intervention.

### 5.4 Limitations and Future Research

The present study is a solidly backed evidence in favor of thumbnail sensationalism but has a number of limitations which give some future research directions. The cross-sectional design can only make an inference about causality, thus experimental and longitudinal studies are required to establish causality and monitor long-term consequences such as habituation. There can be bias in self-reported data; clickstream data and eye-tracking would be more accurate and capture attention to visual cues in real time.

Karachi, Islamabad, Lahore, being an urban sample restricts generalizability, thus national probability sampling would be advisable to cover rural population. Although YouTube was the most used (62%), in the future it is important to compare platforms such as Tik Tok to understand the varying thumbnail dynamics.

The moderation of education finding (14.2-year breakpoint) is self-reported, and thus, needs to be confirmed by objective literacy measures. There were also constraints on cultural aspects, hence cross-cultural research is required to determine whether the effects can be different in a

collectivist versus individualist environment. In general, additional experimental, longitudinal, and cross-cultural studies based on behavioral data are needed to support and expand on these results.

### 5.5 Future Research Directions

Interventions to test thumbnail authenticity, such as A/B testing with the purpose of comparison of the effects of engagement and revenue between standard and moderated thumbnails, and evaluation of algorithmic manipulations, should be tested in experimental studies. Design rationales and ethical considerations can be examined through qualitative interviews with content creators and sensationalism across Pakistani channels can be mapped using mixed-method methods (surveys and content audits).

To determine the extent of repetition exposure on trust and platform fatigue in 6-12 months, longitudinal research is required. The classification systems based on machine learning may allow monitoring sensational content at the population level.

Replication across five countries (Bangladesh, India, and the Middle East) is suggested to examine generalizability in the case of similar collectivist and high-penetration digital environments. Structural equation modeling with latent variables can also be used to extend the validated SOR model ($R^2 = 0.56$), which includes outcomes like trust erosion and content skepticism. All these limitations, in general, indicate the opportunities to intensify SOR applications in digital manipulation studies and contribute to scalable, evidence-based platform changes.

## Conclusion

This paper empirically validates the Stimulus-Organism-Response (SOR) model that thumbnail sensationalism has a direct impact on the psychological reaction and social media engagement behavior amongst Pakistani users. The five hypotheses were all proven by hierarchical regression analysis ($R^2 = 0.56$) which predicted more than half of engagement variance in a sample of 400 urban participants. The greatest predictor was thumbnail sensationalism ($\beta = 0.62$) which explained 38.4% of variance and a significant portion of the relationship was mediated by psychological responses (13.6% Sobel $z = 8.7$). The effect of sensationalism was the most sensitive in YouTube ($M = 3.65$) over Facebook ($M = 3.28$) and the effect size is moderate ($\eta^2 = 0.12$). Education was also a moderating factor with a negative slope ($\beta = -0.15$) and the simple slopes showed a break point of 14.2 years of schooling with the highest effects among secondary-educated users ($\beta = 0.68$) and postgraduates ($\beta = 0.42$).

The results build upon SOR theory by showing that micro-level visual cues, including exaggerated expressions, clickbait signals, and signals of urgency, are powerful psychological stimuli that result in behavioral reactions. There was a high level of reliability ($\alpha > 0.88$), the model did not have any multicollinearity (VIF < 2.1) and good explanatory power (factor structure explained 93.2 percent of variance) and was more effective than traditional SOR models ($R^2 = 0.30–0.40$). The findings indicate that the digital models of behavior built in the Western setting can be used to predict the same in the Pakistani setting, where the level of YouTube penetration is high (62% urban usage), and the high-context culture can enhance the emotional processing of visuals.

In practice, the paper proposes platform-level solutions to include thumbnail authenticity scoring systems, pre-upload visual audits, and lesser visibility of manipulative designs. The risks that are unique to YouTube may need more stringent regulation because of the amplification of engagement through interfaces ($\beta = 0.19$). The proposed policy measures involve clear design principles in creators, emphasis on actual engagement indicators, rather than the number of clicks, and online literacy initiatives by the regulating organizations, especially the Pakistan Telecommunication Authority, especially among secondary educated communities who were the most vulnerable.

Methodological rigor was ensured by strong validation processes, ranging from high internal consistency ($\alpha \geq 0.88$) to reasonable randomness of missing data (Little MCAR $p = 0.42$), and

normality (skewness < 1.5, kurtosis < 2.0), indicating that parametric tests are applicable.

Future studies need to utilize experimental A/B testing of thumbnails, longitudinal studies of the erosion of trust and platform skepticism, cross-cultural replication in analogous online settings (e.g., India, Bangladesh, Middle East), and machine learning-based classification of sensationalism. Designer qualitative studies and mixed-method content audits in large Pakistani cities would provide additional insights about the driving force behind design and ethical forces. The mediation model can be expanded to trust outcomes with the help of structural equation modeling.

On the whole, the given work re-frames thumbnails as design minorities and makes them key drivers of digital persuasion. The tested model provides predictive value to the regulators and platforms to minimize manipulation and maintain engagement. These results suggest that attention capture and informational integrity are crucial factors to consider in the fast-changing digital ecosystem in Pakistan, and the findings can be applied in other emerging markets around the world that encounter the same issue.

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