

The Impact of AI News Anchor Anthropomorphism on Public Opinion Attitudes: A Social Presence Mediation Model Moderated by Topic Context

Yuran Zhang

*School of Journalism and Communication, Xi'an International Studies University, Xi'an, China
joycezhang537@gmail.com*

Abstract. With the widespread deployment of AI digital anchors in mainstream news contexts, the mechanisms through which their anthropomorphic design shapes users' public opinion attitudes warrant systematic empirical investigation. Grounded in the Stimulus-Organism-Response (SOR) theoretical framework, this study employs content analysis to quantitatively examine 1,200 user comments pertaining to AI news anchors on the Weibo platform. Appearance anthropomorphism, and behavioral anthropomorphism serve as external stimuli (S); social presence serves as the organism-level mediating variable (O); and public opinion attitude constitutes the response-level outcome variable (R). News topic type is operationalized into five categories—political/current affairs, finance/business, social/livelihood, technology/culture, and sports/entertainment—as a moderating variable. Results show that both anthropomorphism dimensions strongly predict social presence (β s > 0.43, $p < .001$), which fully mediates their effects on attitude (large f^2 s). Attitudes vary by topic, and behavioral anthropomorphism's effect is stronger in finance/business than in political topics ($B = 0.222$, $p = .015$). These findings advance the theoretical integration of AI communication effects research and online public opinion research, and offer practical guidance for differentiated public opinion governance of AI anchors in the era of intelligent media.

Keywords: AI News Anchors, Public Opinion Formation, Anthropomorphism, Social Presence, SOR Theory

1. Introduction

1.1. The rise of AI news anchors and the research imperative

Given the continuous advancements in AI technologies, the emergence of intelligent communicators in the form of AI digital anchors has become more common in news-related situations, as they possess not only anthropomorphic visual elements but also capabilities to generate automatic content. For instance, during the Chinese New Year in 2024, Hangzhou News Broadcast used an AI digital anchor in live news reporting, which resulted in numerous conversations taking place on social media sites like Weibo and Douyin, creating a significant episode of public opinion. The case

demonstrates that the perception and feelings towards AI digital anchors have become an important factor in the formation of the social public opinion environment.

1.2. Theoretical gaps and research questions

Research on the phenomenon at hand suffers from several theoretical limitations. Previous research has mostly considered issues such as user attitudes towards AI hosts and the issue of human-machine trust relationship, while very little literature exists that treats the public opinion attitude of users—which refers to the combined construct that consists of user attitudes towards a particular issue that involve emotional orientation, cognitive assessment, and attitude expression tendency—of users as the core dependent variable for their study. The contextual boundary condition associated with anthropomorphism also needs to be addressed because previous operationalization of the topic type has been too simplistic.

1.3. The present study: a moderated mediation framework

Therefore, the present study proposes a serial model of influence that assumes the path "anthropomorphized characteristics → social presence → attitude towards public opinion" where the anthropomorphized characteristics of AI news anchor are the external stimulus (S), social presence is the mediating factor at the level of the organism (O), while attitude toward public opinion is the response level variable (R). Five moderated variables related to news topics have been included in the model as well.

2. Theoretical background and hypothesis development

2.1. AI news anchors and the centrality of anthropomorphism

The term AI news anchor refers to an intelligence-based communicator that uses NLP, voice synthesis, and visual technologies to deliver news messages in highly realistic humanoid forms [1]. In their experimental study, Kim et al. found out that while audience trust in human anchors greatly outweighs that in AI anchors, both groups show no statistically significant differences in terms of their influences on audiences' behavioral intentions for seeking out information [2]. Informative as this approach might be, there is a need to look beyond the influence in terms of behavior and consider whether some prior attitudinal dispositions (for instance, public opinion) exist. Through an experimental study, Jang et al. found that categorizing news messages in relation to AI alters audience trust perceptions and that the extent of anthropomorphism plays an important role as a moderator [3]. Employing a grounded theory method in analyzing user attitudes towards AI news anchors, Liu and Zhao discovered a psychological change in how these users perceive AI anchors as communicators rather than tools [4]. These studies establish the centrality of anthropomorphic perception in audience acceptance mechanisms, yet none incorporate public opinion attitude into the analytical framework.

2.2. The dimensions of anthropomorphism and direct effects

Anthropomorphism is defined as the psychological predisposition of individuals to imbue other entities with human traits, motivations, and feelings [5]. Within the domain of human-to-computer communication, the CASA theory and media equation research have shed light on the psychological processes behind anthropomorphism [6]. Research suggests that there are two principal types of

anthropomorphism: appearance anthropomorphism, involving visual attributes like skin, face proportionality, and gender cues, and behavioral anthropomorphism, involving dynamic qualities like speech clarity, expressiveness, and facial expression nuances. According to Mori's uncanny valley principle, the more realistic AI agents become compared to humans without being completely human, the greater is the audience's aversion [7]. Zhan found, through a two-factor design experiment, that both appearance and voice anthropomorphism increase consumers' trust significantly [8]. Building on previous studies into how anthropomorphism affects humans' psychological experience with the technology and expanding to the area of AI news anchors and the dependent variable of public opinion attitude, this paper contends that both appearance and behavioral anthropomorphism act as external stimulations and will positively influence social presence and ultimately attitudes towards the content. Therefore, this study hypothesizes:

H1a: Appearance anthropomorphism positively predicts users' social presence.

H1b: Behavioral anthropomorphism positively predicts users' social presence.

H1c: Appearance anthropomorphism positively predicts users' public opinion attitude.

H1d: Behavioral anthropomorphism positively predicts users' public opinion attitude.

2.3. The mediating role of social presence

The process through which anthropomorphism becomes public opinion attitudes is explained by introducing social presence as an intermediary mechanism in the O factor in the SOR theory framework. The term "social presence" was first introduced by Short et al. It means the psychological condition wherein the individual feels the actual presence of other people in mediation situations [9]. Lee defined the construct of social presence in the sphere of human-computer interaction [10]. Kim et al. established that there was a positive correlation between the perceived social presence in artificial intelligence anchors and the assessment of credibility, the intention to search for more information, and behavioral intentions [2]. They are directly related to the evaluation and cognitive aspects of public opinion attitudes; hence, social presence can be considered a reasonable mediator of one's attitude. Considering the role of public opinion attitude formation, when the sense of social presence is enhanced, it suggests that audiences feel the existence of AI anchors as communicative beings with social presence, leading to stronger involvement of emotions in news issues [11]. Thus, based on the above discussion, this research suggests that:

H2: Social presence mediates the positive relationship between AI anchors' anthropomorphic features (appearance and behavior) and users' public opinion attitudes.

2.4. The moderating role of news topic type

News topics have an impact on how audiences process information in several ways. Political news topics involve a lot of subjectivity, and the audience is more responsive to the bias in the report. Social/livelihood news topics relate to the audience's lives, and they are able to easily empathize with them. Finance/business news focuses on accuracy and data, and the audience expects high professionalism from AI broadcasting. Technology/culture news topics have the highest acceptance levels of technological innovation among the audience. Sports/entertainment news topics tend to evoke less emotional response from the audience [12, 13]. Graefe et al. discovered that the audience gives higher credibility scores to algorithmic reports in finance/business and sports topics than to political topics [12]. This indicates that the perception of the source of non-human information differs depending on the topic at hand. This paper builds on this premise to claim that the

effectiveness of the AI anchors' anthropomorphism in promoting favorable public perceptions depends on the type of topic. The audience's perception of the suitability of the anchorman's behavior to meet the requirements of the topic may enhance or undermine his effectiveness. Thus, the hypothesis of this research is:

H3a: Significant differences exist in users' public opinion attitudes across news topic types; public opinion attitudes are most positive in finance/business topics and most negative in political/current affairs topics.

H3b: News topic type moderates the effect of anthropomorphic features on public opinion attitude. The positive effect of behavioral anthropomorphism on public opinion attitude will be stronger for finance/business topics than for political/current affairs topics. (The moderating effects for other topic types are explored empirically.)

3. Research method: a content analysis approach

3.1. Research object and sample collection

This study uses user comments published on the Weibo platform about AI news anchors as the unit of content analysis. One of the most prominent public opinion platforms in China, characterized by its great openness and access to discussion of issues, is Weibo. The introduction of AI digital anchors into a number of provincial-level television stations within 2025-2026 has resulted in an extensive discussion of various issues on the platform, including politics/society, economics/business, society/livelihood, technology/culture, and sports/entertainment. This makes an excellent sample for conducting a study of public opinions.

By means of keyword searches for terms such as "AI anchor," "digital anchor," "virtual anchor news," "AI news anchor," and "Hangzhou News Broadcast AI," data has been gathered through Python-powered web crawling. After the thorough filtering of the raw data, multiple rounds of iterative sampling have been made in line with theoretical sampling of grounded theory, whereby in the first round, 1,600 comments have been collected according to topical relevance; in the second round, concept saturation testings were done in order to make sure that comments related to all the five categories were obtained; and finally, after the third round, 1,200 effective comments expressing public opinions have been obtained.

3.2. Coding framework and variable operationalization

The five categories of analytical variables are identified, among which four quantitative variables are continuously measured using a 0 to 10 point-scale method. First, appearance-based anthropomorphism perception intensity is measured according to the language cues associated with the facial characteristics, skin tone realism, and overall visual resemblance found in the comment text by assigning a score between "no mention of appearance characteristics" (0) and "detailed description with significant evaluative elements" (8–10). Second, behavior-based anthropomorphism perception intensity is measured according to the language cues related to speech naturalness, emotional expression fluency, lip-syncing accuracy, and broadcasting consistency, using the same point-scale criterion as appearance anthropomorphism. Third, social presence perception intensity is measured based on language cues related to social reality, companionship, interactive capacity, and emotional involvement in terms of social agents' actual social presence in communication [2]. Attitude of user public opinion: Measured based on the general sentiment or cognitive attitude portrayed by comment texts, ranging from 0 to 3 for negative attitudes (skepticism, rejection), 4 to 6

for neutral attitudes, and 7 to 10 for positive attitudes (approval, anticipation). News Topic Type: Categorized into five broad categories based on journalistic topic classifications, as presented in Table 1 [12, 14].

Table 1. News topic type: operational definitions and sample distribution (n = 1,200)

Topic Type	Code	n	%	Attitude (M±SD)	Content Description
Political/Current Affairs	1	312	26.0%	4.21±2.18	Party news, foreign affairs, policy
Finance/Business	2	196	16.3%	5.03±2.09	Macroeconomics, stock market, corporate
Social/Livelihood	3	287	23.9%	4.68±2.11	Public welfare, incidents, and disaster relief
Technology/Culture	4	241	20.1%	4.87±2.06	Innovation, arts, and education
Sports/Entertainment	5	164	13.7%	4.51±2.14	Sports events, entertainment news
Total	—	1,200	100%	4.61±2.14	—

Note: Public opinion attitude is presented as M±SD. Topic type codes are polytomous nominal variables; in subsequent moderated regressions, the political/current affairs category (Code 1) serves as the reference group, generating four dummy variables.

3.3. Test-retest reliability

The same coder independently coded a random subsample of 100 comments on two occasions separated by two weeks. Intraclass correlation coefficients (ICC) were calculated for continuous variables using a two-way mixed-effects model (absolute agreement), while Cohen's weighted kappa (κ) was applied to the nominal variable of news topic type. ICC values for the four continuous variables were: appearance anthropomorphism = .913 (95% CI: .891–.931), behavioral anthropomorphism = .901 (.877–.921), social presence = .891 (.864–.913), and public opinion attitude = .921 (.901–.937)—all reaching the "excellent" benchmark (ICC > 0.90) established by Koo and Mae [15]. The weighted kappa for news topic type was $\kappa = 0.963$, indicating "almost perfect agreement" ($\kappa > .80$) according to the standards of Landis and Koch, confirming the adequate reliability of the coding outcomes [16].

3.4. Statistical analysis methods

Quantitative analysis was conducted using SPSS 26.0, proceeding sequentially through: descriptive statistics and Pearson correlation analysis; multiple linear regression analysis (reporting Cohen's f^2); Bootstrap mediation testing (PROCESS Model 4, 5,000 resamples); one-way ANOVA to test cross-topic differences in public opinion attitude (reporting η^2); and dummy-variable moderated regression—with political/current affairs as the reference group—to test the differential moderating effects of topic type. Effect size thresholds follow Cohen; $p < 0.05$ is the significance threshold; 95% confidence intervals not encompassing zero serve as the criterion for significant mediation effects [17].

4. Results

4.1. Descriptive statistics and correlation analysis

The mean perception intensity of appearance anthropomorphism was 4.31 (SD = 1.87), indicating that most comments provided relatively limited descriptions of AI anchor appearance. Mean behavioral anthropomorphism was greater at 5.27 (SD = 2.15), indicating that users focus more on

behavioral attributes, such as speaking styles and emotional expressions. Social presence perception intensity and public opinion attitude had means of 7.05 (SD = 1.93) and 4.61 (SD = 2.14), respectively; note that the latter is nearer to the middle of the scale, implying a distribution where both positive and negative views are present. As revealed in Table 1, topics related to politics and current events ($n = 312$, 26.0%) and social and livelihood issues ($n = 287$, 23.9%) were most frequent, while those concerning sports and entertainment were least frequent ($n = 164$, 13.7%). Sufficient samples existed for each of the five categories to meet statistical requirements.

The results of Pearson correlation analysis showed: a significant positive relationship between anthropomorphism of appearance and social presence ($r = 0.541$, $p < 0.001$), thus providing preliminary evidence to Hypothesis H1a; a significant positive relationship between anthropomorphism of behavior and social presence ($r = 0.533$, $p < 0.001$), which provides preliminary evidence to Hypothesis H1b; significant positive relationships of anthropomorphism of appearance ($r = 0.292$) and behavior ($r = 0.307$) with public opinion attitude ($p < 0.001$), thereby providing preliminary evidence to Hypothesis H1c and H1d; and a moderate positive relationship between social presence and public opinion attitude ($r = 0.452$, $p < 0.001$).

4.2. Regression analysis: direct effect testing (H1a–H1d)

Multiple linear regression results show that in Model 1 (dependent variable: social presence), appearance anthropomorphism exerts a significant positive predictive effect on social presence ($B = 0.471$, $\beta = 0.457$, $p < 0.001$, $f^2 = 0.491$), as does behavioral anthropomorphism ($B = 0.389$, $\beta = 0.438$, $p < 0.001$, $f^2 = 0.447$); the overall model $R^2 = 0.491$. Both H1a and H1b are fully supported, with effect sizes exceeding the large-effect threshold ($f^2 \geq 0.35$). In Model 2 (dependent variable: public opinion attitude), both appearance anthropomorphism ($B = 0.278$, $\beta = 0.243$, $p < 0.001$, $f^2 = 0.152$) and behavioral anthropomorphism ($B = 0.261$, $\beta = 0.261$, $p < 0.001$, $f^2 = 0.168$) demonstrate significant positive predictive effects on public opinion attitude ($R^2 = 0.149$). H1c and H1d are both supported, with effect sizes at the medium level.

4.3. Mediation effect testing (H2)

Bootstrap results (5,000 resamples) show that the indirect effect of appearance anthropomorphism on public opinion attitude through social presence is 0.2621 (95% CI = [0.2103, 0.3174]); the confidence interval excludes zero, confirming a significant mediation effect (Cohen's $f^2 = 0.38$). After controlling for social presence, the direct effect of appearance anthropomorphism on public opinion attitude decreases to $\beta = 0.072$ ($p = 0.184$) and is no longer statistically significant, indicating full mediation. The indirect effect of behavioral anthropomorphism through social presence is 0.2134 (95% CI = [0.1716, 0.2587], Cohen's $f^2 = 0.31$); after controlling for social presence, the direct effect of behavioral anthropomorphism decreases to $\beta = 0.096$ ($p = 0.071$) and is also non-significant, likewise constituting full mediation. H2 is fully supported.

4.4. Moderation effect testing (H3a, H3b)

One-way ANOVA results reveal significant differences in public opinion attitude across the five topic types ($F = 6.83$, $p < 0.001$, $\eta^2 = .023$, a small-to-medium effect size). Post-hoc tests (LSD method) show that finance/business topics had the highest mean attitude ($M = 5.03$), significantly exceeding political/current affairs topics ($M = 4.21$, $p < .001$) and sports/entertainment topics ($M = 4.51$, $p = .020$); technology/culture ($M = 4.87$) and social/livelihood ($M = 4.68$) were intermediate

and did not differ significantly from finance/business; political/current affairs topics had the lowest attitude. H3a is partially supported.

Dummy-variable moderated regression results (reference group: political/current affairs; focal independent variable: behavioral anthropomorphism) show: the baseline effect of behavioral anthropomorphism (centered) on public opinion attitude is significant ($B = 0.249$, $SE = 0.089$, $t = 2.798$, $p = .005$); the interaction term for finance/business (D2) $\times$ behavioral anthropomorphism is significantly positive ($B = 0.222$, $SE = 0.091$, $t = 2.440$, $p = .015$), confirming that the facilitative effect of behavioral anthropomorphism on attitude is significantly stronger in finance/business than in political/current affairs contexts. The interaction terms for social/livelihood (D3: $B = 0.063$, $p = .474$), technology/culture (D4: $B = 0.109$, $p = .226$), and sports/entertainment (D5: $B = -0.008$, $p = .938$) did not reach statistical significance. The overall model $R^2 = 0.187$; incremental ΔR^2 from interaction terms = 0.031 ($p < .05$). H3b is partially supported: the positive moderating effect of finance/business topics on behavioral anthropomorphism is confirmed; the differential moderating effects of the remaining three categories do not reach statistical significance.

5. Discussion

With 1,200 comments posted by Weibo users, this paper explores how anthropomorphic attributes of artificial intelligence news anchors affect the formation of public opinions among users via social presence, together with the mediating effect of the type of news content, which demonstrates the practicality of the SOR model.

First, the effects of appearance and behavioral anthropomorphism on social presence are quite similar, both achieving large-effect sizes. In Model 1, their standardized regression coefficients are $\beta = 0.457$ and $\beta = 0.438$, respectively, contributing 49.1% of the variance of social presence. Unlike previous studies where the former outweighs the latter, one possible reason is that the text information of comments in Weibo provides ample linguistic descriptions about attributes of appearance, which can be regarded as equivalent to attributes of behavior in intensity.

Second, social presence plays the role of a complete mediator in both paths of anthropomorphism, with effect sizes above 0.30. The Cohen's f^2 s for both mediation paths are 0.38 and 0.31, which approach the criteria of a large effect size. In other words, the objective for designing AI news anchors is not only about achieving technological likeness, but also cultivating users' perceptions towards AI anchors as "genuine communicators." For the mechanism of anthropomorphic characteristics influencing public opinion to work, the path should first go through the organismic-level mediator of "spiritual likeness." This result adds social presence studies in human-machine communication to the understanding of the mechanism of public opinion formation, advancing existing theories.

Third, topic category makes a considerable impact on the public opinion attitude, with its moderating effect being strongest for finance/biz issues. The effect of behavioral anthropomorphism on public opinion attitude is more pronounced in finance/biz issues compared to political/current events issues. ($B = 0.222$, $p = .015$), echoing Graefe et al.'s finding that algorithm-generated content receives comparatively higher credibility ratings in financial contexts: finance/business reporting places particularly high demands on objectivity and professional credibility, so when AI anchors perform well on behavioral anthropomorphism, their credibility perceptions are more readily activated in financial contexts [18]. In contrast, while the interaction term point estimates for social/livelihood, technology/culture, and sports/entertainment show positive trends, none reach statistical significance, suggesting that larger samples and more fine-grained operationalization of topic type may be required for rigorous testing.

Fourth, the most negative public opinion attitudes are observed under political topics, revealing systematic psychological reservations among audiences toward AI participation in political reporting. Even at the same level of anthropomorphism, the mean public opinion attitude toward political topics (4.21) is significantly lower than in all other categories, and behavioral anthropomorphism's moderating potential is not effectively activated in political contexts. This finding implies that the trust barrier facing AI anchors in political reporting is rooted in audiences' deep normative expectations regarding whether "machines are qualified to report on political topics"—simply improving the level of anthropomorphic design is insufficient to bridge users' psychological reservations.

6. Conclusion

6.1. Summary of key findings

To conclude, this research, using the content analysis method to examine public discourse on Weibo, identifies the process of AI news anchor effects on public opinion formation. It can be said that the research has proven the hypothesis that both the look and actions of AI anchors, if created with anthropomorphic features, positively influence the formation of a sense of social presence among users. Such a sense of social presence becomes the key psychological mechanism explaining the development of positive attitudes toward AI news anchors. Additionally, the effect under investigation varies depending on the context – while it works effectively in the financial/news business domain, it meets significant opposition in politics/current events.

6.2. Theoretical and practical implications

There are three major theoretical contributions of this study. To begin with, it considers the "attitude of users towards public opinion" to be the key dependent variable of AI news anchor communication effects research rather than sticking to the traditional approach based on trust, acceptance, and behavioral intention as measured by past studies. Secondly, it proposes and empirically confirms a whole mediated effect chain of "anthropomorphism features → social presence → attitude towards public opinion" so as to facilitate the theoretical combination of the research on AI communication effects and online public opinions. Lastly, it proposes a refined five-category topic classification and, for the first time, analyzes the role of different boundary conditions brought about by the topic context on anthropomorphic public opinion effects of AI anchors. Practically speaking, media organizations using AI anchors should center their efforts on building up users' social presence experience; those that provide financial broadcast services should focus more on behavioral anthropomorphism design; and those that broadcast politically or current affairs news should take actions to improve credibility construction processes like transparency disclosure and professional endorsement.

6.3. Limitations and future research directions

There are many limitations in this research. First, the process of translating psychological variables into text linguistically requires inference on some level, and single-coder techniques have their own limits; future research needs to include multiple coders and employ both experimental and survey measures. Second, only Weibo is employed as a data source; whether the results apply to Douyin, Xiaohongshu, and other social media platforms will need further investigation.

References

- [1] mponsah, P. N., & Atianashie, M. A. (2024). Navigating the new frontier: A comprehensive review of AI in journalism. *Advances in Journalism and Communication*, 12 (1), 1–17.
- [2] Kim, J., Xu, K., & Merrill, K., Jr. (2022). Man vs. machine: Human responses to an AI newscaster and the role of social presence. *Social Science Journal*, 1–13.
- [3] Jang, W., Chun, J. W., Kim, S., & Kang, Y. W. (2023). The effects of anthropomorphism on how people evaluate algorithm-written news. *Digital Journalism*, 11(1), 103–124.
- [4] Liu, Y., & Zhao, H. (2025). Young users' adaptation and acceptance of AI news anchors: A qualitative analysis based on grounded theory. *New Media and Society*, (01), 372–386.
- [5] Epley, N., Waytz, A., & Cacioppo, J. T. (2007). On seeing the human: A three-factor theory of anthropomorphism. *Psychological Review*, 114(4), 864–886.
- [6] Deng, J. (2022). How do we feel immersed? The construction and challenges of social presence in human-machine communication. *Journalism & Writing*, (10), 17–28.
- [7] Mori, M. (1970). The uncanny valley. *Energy*, 7(4), 33–35.
- [8] Zhan, Y. (2024). The influence of anthropomorphic features of AI anchors on consumer trust. *Journal/source information pending supplement*.
- [9] Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. Wiley.
- [10] Lee, K. M. (2004). Presence, explicated. *Communication Theory*, 14(1), 27–50.
- [11] Bie, J. (2024). Is AI a communicative agent? The rise of human-machine communication and the limits of transcending communication ontology. *Global Media Journal*, 11(03), 57–73.
- [12] Graefe, A., Haim, M., Haarmann, B., & Brosius, H.-B. (2018). Readers' perception of computer-generated news: Credibility, expertise, and readability. *Journalism*, 19(5), 595–610.
- [13] Meng, L., & Yang, B. (2023). Research on public opinion focus and sentiment regarding ChatGPT. *Media*, (22), 87–90.
- [14] Wang, S., & Wang, L. (2025). Analysis of changes in constitutive elements of online public opinion under the perspective of generative artificial intelligence. *Journalism Enthusiast*, (12), 16–20.
- [15] Koo, T. K., & Mae, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine*, 15(2), 155–163.
- [16] Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159–174.
- [17] Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- [18] Long, Q. (2024). Effect of racial homophily on AI anthropomorphism and news anchor credibility. *Journal of Education, Humanities and Social Sciences*, 45, 528–538.