Investigating the impact of personalized headnotes for English-speaking audiences in viewing Chinese comedies

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[1]

Abstract

This article explores the use of personalized headnotes (PHNs) to enhance the viewing experience of English-speaking audiences watching subtitled Chinese comedies. Based on personalization and relevance theory, this study employs eye-tracking, questionnaires, and interviews to assess the impact of PHNs on audience reception. Findings suggest that while PHNs enhance comprehension of cultural references, their effect on humor appreciation varies with individual preferences and viewing goals. This indicates the need for a tailored integration of subtitles and headnotes to cater effectively to diverse viewer preferences. The study contributes to audiovisual translation (AVT) research by advocating for subtitles that minimize processing effort while maximizing communicative impact for an enhanced overall viewing experience.

Keywords: personalize, subtitling, humor, relevance theory, reception studies

The authors report there are no competing interests to declare.

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1 Introduction

As media production evolves, new forms of subtitling have emerged, diverging from the conventional styles traditionally crafted by professional translators. For instance, Pérez-González (2013) investigated the practice of authorial titling in BBC's 'Sherlock', while Sasamoto and colleagues (Sasamoto & Doherty, 2015; O'Hagan & Sasamoto, 2016; Sasamoto et al., 2017) analyzed the adoption of extra-large, brightly coloured fonts and multilingual 'impact captions'—a concept used by Park (2009) in Korea and synonymous with 'telop' used in television programs in Japan and other parts of Asia.

Creative subtitling, designed to meet the distinct needs of diverse audiences, offers customized solutions that enhance the artistic expression of films by transcending the limitations of a standard, one-size-fits-all approach (McClarty, 2012, 2014). Additionally, to improve audience engagement, researchers including Fox (2016) and Black (2022) have proposed integrating subtitles by positioning them closer to speakers or in other strategic locations on the screen to align more closely with viewers' preferences. Despite these advancements, the impact of various subtitling strategies on audience reception and the exploration of customized or personalized subtitling to enhance understanding of humor and cultural references remain underexplored in the literature.

Building on creative subtitling for catering to audience needs, it is crucial to address translation challenges like cultural references for different audiences. According to González-Davies and Scott-Tennett, a cultural reference is defined as:

> [a]ny kind of expression (textual, verbal, non-verbal or audiovisual) denoting any
> material, ecological, social, religious, linguistic or emotional manifestation that can be
> attributed to a particular community (geographic, socio-economic, professional,

linguistic, religious, bilingual, etc.) and would be admitted as a trait of that community by those who consider themselves to be members of it. Such an expression may, on occasions, create a comprehension or a translation problem (2005, p. 166).

As cultural references can pose significant challenges in translation, several strategies have been proposed as solutions, including lexical recreation, generalization, domestication and foreignization. For instance, Pérez and Javier (2017) applied relevance theory to analyze subtitles in the American TV series 'Modern Family', demonstrating the necessity of strategic choices to maintain humor and relevance when translating cultural references. Díaz Cintas and Remael (2007) also note that conveying cultural elements in subtitles poses inherent challenges due to potential disparities in cultural equivalence, necessitating creative translational strategies to bridge such gaps effectively and maintain the intended humor.

Building on these insights, this research explores the use of headnotes, a technique commonly employed by fan subtitlers, to explain cultural elements and references using various translation strategies. Headnotes, explanatory notes appearing at the top of the screen, are often displayed alongside standard subtitles (henceforth SBS). This term, adapted from Diaz Cintas and Remael (2014, p. 141), differs from traditional professional subtitling and is considered a form of creative subtitling. Other forms of creative subtitles, such as authorial titles (Pérez-González, 2013) and impact captions (Park, 2009; Sasamoto & Doherty, 2015) are designed to enhance narrative progression through more engaging viewer interaction (Dwyer, 2015). Headnotes similarly aim to engage viewers by providing explicit interlingual annotations on humor and/or cultural references, assuming viewers lack prior knowledge of these aspects. Drawing on personalization and relevance theory, this article explores their application in subtitling of Chinese comedies for English-speaking audiences.

This study addresses the following questions:

RQ1: Is the appreciation of humor affected by the use of PHNs?

RQ2: Is the comprehension of humor affected by the use of PHNs?

RQ3: Is there a correlation between participants' CQS/BFI-S scores and their PHN preferences?

This article is structured as follows: Section 2 establishes the theoretical framework, integrating relevance theory with personalization concepts to inform our approach to subtitling humor. Section 3 details our mixed-methods, including eye-tracking, questionnaires, and interviews. Section 4 presents the empirical findings organized by our three research questions, while Section 5 discusses their implications for audiovisual translation practice and theory, with conclusions and limitati-ons.

2 Relevance theory, personalization and humor

2.1 Relevance theory and AVT

Relevance theory is proposed and developed by Sperber and Wilson (1986/1995). Central to relevance theory is the understanding that human cognition is relevance driven, in that individuals seek to maximize cognitive effects while minimizing processing effort when engaging with new information. Relevance theory provides a useful theoretical basis for analyzing viewer behavior in AVT (Braun, 2016), as it enables the examination of the interpretation process from a cognitive perspective without relying on ad-hoc terminologies. However, Braun (2016) and Bogucki (2020) highlight that much of the existing research on relevance theory in AVT remains preliminary, relying heavily on exploratory and case-specific studies. This reliance limits the generalizability and practical application of the findings. Thus,

further studies are necessary to refine subtitle translation practices, ensuring they adequately cater to the cognitive and cultural needs of target viewers. This study aims to address these gaps by providing a more systematic and comprehensive analysis of how relevance theory can be applied to improve subtitle translation, ultimately enhancing the viewing experience for diverse audiences.

Relevance theory is centred around the principle that '[h]uman cognition tends to be geared to the maximization of relevance' (Wilson & Sperber, 2004, p. 610), and here relevance is defined as the balance between cognitive effects and processing effort. This Cognitive Principle of Relevance provides the fundamental premise, which assumes that human beings naturally focus on stimuli that are relevant to them, which can alter their cognitive environment. These alterations are referred to as cognitive effects. According to relevance theory, the greater the cognitive effects produced by a stimulus, the more relevant it is. However, this relevance must be balanced against the processing effort required for achieving optimal relevance; increased effort reduces overall relevance.

As Bogucki (2020) argues, translator's decision making is also relevance driven, in that translators aim to ensure that the translated text provides sufficient cognitive effects with the least amount of processing effort for the readers, and for the audience in the case of AVT. In relevance theory, translation is seen as a case of interpretive resemblance, where the goal is to produce a target text that share implications with the source text in terms of the intended cognitive effects (c.f. Gutt, 2014; Gallai, 2022; Sasamoto, 2024). This involves delivering a version of a joke or humorous element, for example, that creates the same effects in the target language as it does in the source language. Consequently, a translator needs to consider what background knowledge and cultural references the target audience is likely to have to aim for

maximum cognitive effects. For example, a joke that relies on a culture-specific reference must be adapted in a way that the target audience can understand and find humorous. This adaptation is aimed to ensure that the cognitive effects are maximized while the processing effort is minimized, achieving optimal relevance for the audience. Thus, it is particularly important to consider how translators can cater to specific audiences, making the notions of relevance theory and personalization useful here.

2.2 Personalization and personas

The concept of personalization is widely applied across various domains such as e-learning, product design, and subtitling to improve user experience and effectiveness. For instance, Sáiz-Manzanares et al. (2019) have demonstrated its application in digital interactive platforms to facilitate deep learning among students. Similarly, personalization has been utilized to enhance the usability of products and services, such as in the creation of customized phone cases (e.g., Göker & Myrhaug, 2002; Blom & Monk, 2003). In AVT, Manchón and Orero (2018) investigated end-user subtitle setting preferences and the usability of personalized subtitles to identify user preferences for subtitle customize features such as position, size, and font. These studies highlight the significance of and interest in customized subtitles.

The concept of 'personas' plays a key role in personalization, representing real user groups with their demographic information, contexts, goals, and technical expertise, to enhance product design and user experience. Personas help developers by providing a detailed description of hypothetical users, representing a group throughout the design process (Sinha, 2003; Cooper, 2004). In translation studies, personas have been used to improve workflows and translation environment tools (TEnTs). Van den Bergh et al. (2015) developed personas to enhance TEnT usability and efficiency. Translators use personas to integrate end users in user-

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centered translation and select appropriate translation strategies (Suojanen et al., 2014). Moreover, personalization has been crucial in allowing viewers to access more customized settings, improving user experience and interaction with technology (e.g., Manchón & Orero, 2018). O'Brien and Conlan (2018) suggest enhancing translator-computer interaction through personalized translation technology, considering aspects such as context, user modelling, trust, motivation, and well-being.

One of the challenges of personalization is how to operationalize persona and how to identify scales and metrics that can be used to imagine a particular audience group. In personalization literature, the Cultural Intelligence Scale (CQS) and the Big Five Personality Inventory Metrics (BFI-S) have been applied as scales to explore individuals' ability to function in culturally diverse settings (e.g., Poort et al., 2021). The CQS assesses cultural adaptability, and BFI-S measures personality traits, enabling an understanding of viewers' cultural adaptability and personality traits.

Drawing on Sternberg and Detterman's (1986) intelligence model, Cultural Intelligence (CQ) is conceptualized by Ang et al. (2007) and Ang and Van Dyne (2008) as comprising four dimensions—metacognitive, cognitive, motivational, and behavioral—which are crucial for effective functioning in culturally diverse settings. These dimensions encompass strategic cross-cultural planning, understanding of cultural norms, motivation to adapt to cultural diversity, and the ability to adjust verbal and nonverbal behaviors for effective cross-cultural communication. According to the theory of CQ, individuals with higher levels in the four dimensions of CQ—measured using the CQS developed by Ang et al. (2007)—are more adept at effective communication and integrating information from various cultures. CQS, a twenty-item self-report scale, has been validated across diverse contexts and is widely used in

educational and training settings to prepare individuals for international work and living environments.

Additionally, Ang et al. (2006) demonstrated that the four dimensions of CQ are distinct yet theoretically linked to the Big Five personality traits—Openness, Conscientiousness, Extroversion, Agreeableness, and Neuroticism (OCEAN)—which are stable, fundamental human characteristics observable across different countries. These traits, measured by BFI-S, significantly correlate with various aspects of CQ. For instance, openness is linked to all four CQ dimensions, conscientiousness to metacognitive CQ, agreeableness and neuroticism to behavioral CQ, and extroversion to cognitive, motivational, and behavioral CQ. Using significant correlations between the Big Five and the four dimensions of CQ, Ang et al. (2006) describe personality as a predictor of CQ and their results suggest that individuals with higher scores on these personality traits show greater cultural adaptability and are better equipped for interaction in multicultural settings.

By assessing viewers' CQ, PHNs were tailored to address specific areas where viewers might need additional support in understanding cultural elements. Integrating CQS and BFI-S assessments into the development of PHNs was assumed to enhance the overall subtitle viewing experience, making it more engaging and comprehensible for culturally diverse audiences. The basic assumption driving this was that individuals with higher cultural adaptability are better equipped to understand and appreciate cultural references and humor that differ from their own.

Thus, in this study, the pre-task questionnaire incorporating CQS and BFI-S was utilized to gauge individual cultural adaptability. Building on the theory of personalization, two personas

were created based on assumed scores from these tests, establishing a comparative framework for assessing variations in cultural adaptability among participants. By combining relevance theory with personalization, two types of PHNs were designed to optimize cognitive effects and minimize processing effort, tailored to different levels of cultural adaptability and preferences of viewers. This approach aims to enhance viewers' comprehension and enjoyment of subtitled content, ensuring that subtitles with PHNs are both engaging and effective across culturally diverse audiences. Cultural adaptability was used to determine the level of detail and context needed in PHNs, ensuring that viewers could better comprehend the subtitled content through tailored PHNs based on their assessed adaptability.

Persona one, characterized by low scores on the CQS and BFI-S questionnaires, is assumed to have limited adaptability in multicultural environments. This necessitates the adapted use of familiar Western cultural references (PHN1) to aid in understanding humor in Chinese comedies. PHN1 employs a domestication strategy, making the content more relatable by providing familiar references tailored to those with low cultural adaptability. Conversely, Persona two, scoring high on the questionnaires, exhibits greater ease in navigating diverse cultural contexts. Hence, this group can comprehend cultural references through authentic explanations that maintain the original cultural elements (PHN2). PHN2 utilizes a foreignization strategy, preserving authenticity and richness of the source text. This approach provides more comprehensive explanations, allowing viewers with high cultural adaptability to appreciate the details and richness of the original culture. Tailoring PHNs based on cultural adaptability ensures that the provided explanations are appropriately balanced—not too simplistic for those with high adaptability and not too complex for those with low adaptability. This strategy aims to enhance the viewing experience by aligning the level of detail in PHNs with the viewer's cultural comprehension capabilities.

For instance, as illustrated in Table 1, source text is the original dialogue in Chinese, SBS are shown at the bottom of the screen for the audience, and PHN1 utilizes an idiomatic expression to explain the reference of '81 traffic lights' tailored to Persona one's preference for familiar (domestic) cultural references. In contrast, PHN2 offers a foreignized explanation that preserve the original cultural context, catering to the more culturally adaptable Persona two. This approach underscores the primary strategy in developing PHNs, which involves deciding whether these references should be conveyed through more Western references (domestication) or more authentic explanations that maintain the original cultural context (foreignization). As a result, the average character length of eleven PHN1 is 25.55, while eleven PHN2 have an average length of 42.27 characters—approximately 1.65 times longer.

These persona-driven PHN designs set the stage for evaluating how different viewers process humor, which we examine through the dual lenses of appreciation and comprehension (see section 2.3).

2.3 Humor reception: appreciation and comprehension

This research focuses on evaluating the effectiveness of PHNs by measuring humor appreciation and humor comprehension. The main research question (RQ) is:

> What is the impact of personalized headnotes (PHNs) on the audience reception of humor in subtitled comedies?

Humor manifests in various forms. Gavanski (1986) identifies that humor primarily connects with emotional responses, while assessments of funniness tend to align more with cognitive

processes. Building on this, this research categorizes the reception of humor into two distinct facets:

1) Humor appreciation, which encompasses observable responses like laughter and facial expressions, collectively referred to here as 'mirth'. Mirth, in this context, includes a range of expressions from a faint smile to a broader smile, escalating to audible chuckling and even laughter as the emotional intensity increases (Martin, 2007, p. 155).

2) Humor comprehension, which involves the cognitive evaluation of humor's understandability.

This study focuses on humor that typically elicits observable mirth (e.g., light-hearted or situational comedy), excluding forms like dark humor where laughter may not be an expected response. Thus, drawing upon Gavanski (1986) and Martin (2007), we evaluate humor reception through two distinct but complementary dimensions: humor appreciation (measured via observed mirth and self-reported enjoyment), and humor comprehension (assessed through accuracy in understanding cultural references and jokes). These dimensions align with our research questions (see Section 1) to examine how PHNs influence both emotional engagement and cognitive understanding in the cross-cultural comedy viewing.

3 Methodology

To empirically address these RQ, the research employed a mixed-methods and within-subject design. It used three methods: eye-tracking and questionnaires to gauge humor appreciation, and a combination of questionnaires and semi-structured interviews to assess humor comprehension. This triangulation allows for a detailed analysis of how humor is appreciated and understood by viewers.

Eye-tracking, based on the eye-mind hypothesis proposed by Just and Carpenter (1980), was used to monitor participants' eye movements to ensure they read both SBS and PHNs. This hypothesis has underpinned the extensive use of eye-tracking devices in translation studies, first introduced by O'Brien (2009), and subsequently in AVT studies, examining subtitling and viewers' reading or viewing processes (e.g., Szarkowska & Gerber-Morón, 2018; Black, 2022). This technology was supplemented with facial expression recordings to observe mirth, serving as an indicator of humor appreciation.

Two questionnaires were used: a pre-task questionnaire to gather data on participants' scores of CQS and BFI-S, and a post-task questionnaire (see Appendices 2-4) after viewing each of the three clips to assess humor comprehension and understanding of SBS and PHNs. Semi-structured interviews provided deeper insights into participants' perceptions. A pilot study with six participants led to adjustments based on their feedback. Institutional ethics approval was obtained from all the participants.

3.1 Pre-task questionnaire[1]

Based on established correlations between personality traits and cultural intelligence (Ang et al., 2006; Wilson et al., 2013), we operationalized: positive associations: openness (Q1), conscientiousness (Q2), extroversion (Q3), and agreeableness (Q4) with CQ; negative association: neuroticism (Q5) with CQ. This classification aimed to explore correlations between personality traits and CQ, hypothesizing that Persona one (low cultural adaptability) would prefer PHN1, while Persona two (high cultural adaptability) would prefer PHN2. The pre-task questionnaire's CQS and BFI-S results enabled participant classification into two groups:

1. Persona one (low cultural adaptability): n=22 participants scoring below median on both scales

2. Persona two (high cultural adaptability): n=18 participants scoring above median[2]

This grouping determined which PHN version (PHN1 or PHN2) participants would view first in the counterbalanced design, though all participants eventually experienced all three subtitling conditions.

3.2 Procedure

The study employed a Tobii T60XL desktop eye tracker, which operates without requiring participants to wear any equipment. This non-invasive system uses infrared cameras mounted below the screen to record eye movements at 60Hz. All participants confirmed they experienced no physical discomfort during calibration or viewing sessions. A total of forty participants for the main experiment viewed three video clips from a Chinese variety show (titles: Are you asleep, Dramatic GPS, Time flies) under different conditions: SBS only, SBS with PHN1, and SBS with PHN2. The authors translated, crafted, and edited subtitles and headnotes for all clips, which were then proofread by a native Chinese-speaking translator and a native English speaker.

The video clips were presented in random orders to minimize order effects and bias. Prior to the experimental clips, participants viewed a two-minute baseline video selected from the same variety show featuring similar style and humor type to the test materials. This baseline served

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[2] From an initial pool of 92 respondents, 80 eligible participants completed the pre-task questionnaire (BFI-S: 5 items, Cronbach's α=0.82; CQS: 20 items, α=0.91; combined α=0.88). After applying median cutoffs for group classification and accounting for attendance, a total of 40 participants completed the main experiment which were further classified into two persona groups.

to: 1) familiarize participants with the viewing procedure; 2) establish a consistent cognitive state before testing. The baseline clip contained comparable audiovisual elements (e.g., multi-speaker dialogue, visual humor) but distinct content to avoid influencing responses to the experimental videos.

Subsequently, the participants watched three subtitling conditions (each approximately ten minutes) in different sequences to ensure equal exposure. After each viewing, participants completed the post-task questionnaire on the screen and participated in a ten-minute interview to gather insights into their responses.

During the main experiment, six participants' eye-tracking data failed to meet the 70% validity threshold for tracking ratio of data quality (Hu, 2020; O'Brien, 2009) and were consequently excluded from analysis. This resulted in thirty-four valid datasets being retained for the study. The number of participants varied across the three conditions, with either eleven or twelve in each condition.

4 Results

4.1 Eye-tracking data

Eleven Areas of Interest were defined for analysis (see Table 2), covering both subtitle areas and specific headnotes, with engagement observed from appearance to three seconds post-disappearance to account for reading speed variations.

Fixation duration data was collected and analyzed using Tobii Pro Lab software. Initial tests confirmed normal distribution of the data (p-values > 0.05). Subsequently, a one-way ANOVA test (see Table 3) revealed significant differences in mean fixation durations across viewing

conditions: SBS (181.53 ms), SBS + PHN1 (141.41 ms), and SBS + PHN2 (155.01 ms) ($p <$ 0.05).

Post hoc analysis using Tukey's HSD test, detailed in Table 4, indicated significant differences between SBS and both PHN conditions, but not between PHN1 and PHN2 themselves. This suggests varied engagement levels between standard subtitles and both types of headnotes.

Despite their differences, participants spent similar times fixating on PHN1 and PHN2. Further, to account for differing text lengths, mean fixation durations were normalized per character, revealing a significant disparity: participants spent proportionally longer time per character on PHN1 (5.88 ms) than on PHN2 (3.66 ms) ($p < 0.05$), indicating that PHN1's brevity did not solely drive its preference.

4.2 Observed mirth

Participants' facial expressions, captured via the eye tracker's integrated camera, are indicative of their amusement levels. The summary of observed mirth[2] among thirty-four participants under three different subtitling conditions revealed a generally limited amount of mirth in response to Areas of Interests. This suggests that pronounced mirth was infrequent, with many participants showing either restrained emotional expression or limited perceived humor in the content.

Prior to conducting our primary analyses, we performed two diagnostic tests to characterize our data distribution:

- Kolmogorov-Smirnov Tests confirmed the non-normal distribution of mirth scores across all conditions (SBS: $D = 0.28$, $p < .001$; PHN1: $D = 0.31$, $p < .001$; PHN2: $D = 0.29$, $p < .001$)

- Levene's Test indicated homogeneity of variance across conditions ($F(2, 99) = 0.89$, $p = 0.41$)

Given these results and the ordinal nature of the mirth scale, we appropriately selected non-parametric tests for all subsequent analyses. To further explore whether mirth varied significantly across the conditions, a Friedman's test was applied, resulting in $\chi^2(2) = 13.99$, $p = 0.0009$, Kendall's $W = 0.21$. This indicates significant differences in the observed mirth between at least two of the conditions, suggesting that the display of mirth varies statistically across these conditions. Subsequent pairwise comparisons using Conover's test confirmed significant differences between each pair of conditions: SBS > PHN1: $p = 0.018$ ($d = 0.42$); SBS > PHN2: $p = 0.007$ ($d = 0.51$); PHN1 > PHN2: $p = 0.032$ ($d = 0.36$).

The results of observed mirth revealed a pattern of SBS > SBS + PHN1 > SBS + PHN2:

1. SBS elicited more mirth than the condition with PHN1,

2. SBS elicited more mirth than with PHN2,

3. PHN1 elicited more mirth than with PHN2.

These eye-tracking results suggest that the use of PHNs negatively impacts humor appreciation, contradicting the initial expectation that humor appreciation would be higher with PHNs than with SBS alone. However, humor appreciation appears to be higher with PHN1 compared to PHN2. This aligns with relevance theory's processing effort principle (Sperber and Wilson, 1986/1995): culturally distant explanations (PHN2) demand greater cognitive resources, leaving fewer emotional response. Further data triangulation with questionnaire responses was conducted to develop a more comprehensive understanding of humor appreciation.

4.3 Post-task questionnaire data

The post-task questionnaires (see Appendices 2-4 for full details) varied by subtitling condition: twelve questions for SBS-only and fifteen for SBS with PHNs. Q1 assessed participants' familiarity with the cultural references or humor in the clips. Q2 to Q5 evaluated their comprehension, and the remaining questions focused on their attitudes toward videos, subtitles, and headnotes (in PHN1 and PHN2 conditions).

4.3.1 Self-reported familiarity level

The first question in all the post-task questionnaires (Q1: Are you familiar with the cultural references/humor in this clip?) aimed to assess participants' familiarity with the Chinese-specific cultural humor embedded in the clips across three conditions.

The data revealed a general unfamiliarity among participants with Chinese humor and cultural references. This trend persisted across all subtitling conditions—SBS, SBS+PHN1, and SBS+PHN2. While a few participants reported some familiarity with specific clips, the majority found the humor novel or only slightly familiar.

4.3.2 Comprehension test

Q2 to Q5 evaluated comprehension across three subtitling conditions, focusing on cultural references and humor to address RQ2: Is the comprehension of humor affected by the use of PHNs? These questions, detailed in Appendices 2-4, were consistently applied across all conditions. For example, in Clip three, Q3 assessed participants' understanding of the Chinese social media feature 'Moments', while Q4 required recognition of the 'like' icon on WeChat.

Participants were scored on a five-point Likert scale, with each correct answer receiving one-point, incorrect answers 0.5, and 'E. I cannot remember' receiving zero. The scoring system was kept undisclosed to avoid bias.

The analysis of Q2-Q5 revealed a deviation from the expected normal distribution, leading to the use of Friedman's test, which did not show significant results. This prevented the application of repeated measures ANOVA (rANOVA) and subsequent post hoc analysis. However, Spearman's correlation analysis (r_s = -0.13, p = 0.19) suggested a weak trend where comprehension scores decreased as subtitling conditions transitioned from SBS only to PHN1 and then PHN2, implying a potential decline in comprehension with the introduction of PHNs.

These findings suggest that viewers can effectively understand humor and cultural references in Chinese videos using standard subtitles alone, without additional explanatory headnotes. This observation aligns with Perego et al. (2010, p. 263), who contend that viewers can efficiently process subtitles without compromising their attention to visual elements, demonstrating an inherent capacity to assimilate subtitled content effectively.

4.3.3 Attitude test

In the attitude test, participants rated their agreement on a five-point scale from 'strongly agree' to 'strongly disagree' (scored from five to one). Scores for negatively framed items were reversed for Cronbach's alpha computation to ensure consistent interpretation. For instance, a score of five for 'I think this video is funny' indicated strong agreement, while a score of five for 'I think the subtitles interfere with my understanding of the humor in the video' indicated strong disagreement.

The reliability analysis results exceeded the 0.7 threshold (SBS: 0.73; SBS+PHN1: 0.88; SBS+PHN2: 0.87), indicating high internal consistency. After each condition viewing, participants responded to statements about their experiences with different subtitling conditions without knowing which specific condition they had encountered. The attitude survey aimed to determine if PHNs affect perceptions such as humor appreciation and comprehension.

1) Perceived appreciation of humor

Results regarding appreciation of humor illustrate that a significant majority of participants, particularly in the PHN1 condition, found the video content humorous, with 86% indicating agreement or strong agreement. This rate was slightly higher compared to the other conditions, with 76% (SBS) and 77% (PHN2) respectively. Further comparisons indicate that over half of the participants experienced an enhanced humorous response to videos with PHNs, compared to SBS only. This suggests that the addition of headnotes potentially enhances, or at least does not detract from, the perceived humor appreciation. Specifically, PHN1 was slightly more favored over PHN2, indicating a preference for the way humor was delivered in PHN1.

However, a weak negative relationship (r_s = -0.06, p = 0.56) was found between three conditions and the agreement with the statement about humor appreciation, suggesting a mixed effect of PHNs on humor. Similarly, the relationship between humor appreciation in PHN1 and PHN2 also showed a weak negative correlation (r_s = -0.10, p = 0.44), suggesting a slight preference for PHN1 over PHN2. These correlations were not statistically significant, indicating that the observed preferences might be due to chance.

2) Perceived reading time

Participants' perceptions of having sufficient time to read subtitles declined with the introduction of PHNs. In the SBS condition, all participants felt they had enough time to read subtitles. However, with the addition of PHN1, only 62% felt they had adequate time, and this decreased further to 45% with the introduction of PHN2. Many participants struggled with PHN2, finding it difficult to process them with SBS. Specifically, 47% of participants indicated discomfort due to limited time with PHN2. This issue is likely because PHN1, on average, is shorter (mean = 25.55 characters) compared to PHN2 (mean = 42.27 characters). The longer length of PHN2 may have caused participants to rush, resulting in less perceived reading time. This suggests length and complexity of PHNs need to be carefully managed to avoid overwhelming viewers.

3) Perceived ease of comprehension

The perceived ease of comprehension varied across conditions, with participants finding the SBS-only condition the most straightforward, followed by PHN1. PHN2 was seen as the most challenging condition, suggesting that the complexity of PHN2 may have negatively impacted their ease of comprehension. This complexity likely arises from the explanations provided in PHN2, which, while maintaining the original cultural context, demands greater effort to process.

The average longer character length and more intricate cultural references in PHN2 may have caused overload for some participants, making it harder for them to follow along with the subtitles. Consequently, while PHN2 was perceived to enhance cultural understanding, its complexity necessitates a careful balance to ensure that it does not detract from overall comprehension.

4) Perceived comprehension of humor

Responses show that most participants in the SBS only condition (94%) found subtitles helpful for understanding humor. However, in conditions with PHNs, the approval level dropped to 70%, with some participants expressing stronger dissatisfaction. The results (r_s = -0.25, p = 0.01) indicate that as the complexity of subtitling conditions increases from SBS to PHN1, and especially to PHN2, participants' agreement that their humor comprehension improved decreases. Conversely, over 90% participants did not perceive subtitles as obstructive to their understanding of humor in the SBS condition. The data suggest a potential tendency for some participants to perceive headnotes as interfering with humor comprehension more than subtitles alone, though this pattern was not uniformly observed across all viewers.

5) Perceived comprehension of cultural references

In assessing comprehension of cultural references, our findings indicate that a significant majority of participants found subtitles and headnotes helpful across different conditions. In the SBS-only condition, 71% of participants believed subtitles facilitated their understanding of cultural references. The perception of helpfulness increased in the conditions with headnotes: over 80% found PHN1 (88%) and PHN2 (85%) helpful in this regard (r_s = 0.23, p = 0.02). This result suggests that the addition of headnotes, from PHN1 to PHN2, is likely viewed by participants as increasingly beneficial for understanding Chinese cultural references.

In assessing the impact of SBS and PHNs on the comprehension of cultural references in a negative format, the data reveals a slight decrease in the proportion of participants expressing disagreement with the statement about interference as the subtitle conditions changed: 88% in SBS, 85% in PHN1, and 79% in PHN2. The correlation analysis between different conditions and perceptions of interference ($r_s = -0.09$, $p = 0.35$) suggests that while some participants may perceive an increase in interference with the addition of PHNs, this perception is not consistent across the group.

Further exploration of questionnaire preferences shows that acceptance levels for PHN1 and PHN2 are relatively similar, with little difference in participant ratings for these headnotes ($r_s = 0.06$, $p = 0.64$). This suggests varied individual preferences for headnotes among participants, indicating that viewer reception varies, without a clear consensus on their impact, underscoring the importance of customize in media consumption.

4.4 Interview data

The final stage involved ten-minute interviews (as listed in Appendix 5) to explore participants' perceptions of three subtitling conditions, with headnotes and experimental objectives disclosed at the end to avoid priming effects. A thematic analysis, based on Braun and Clarke (2006) and conducted using NVivo software, identified, coded, and categorized themes and sub-themes to provide detailed insights into participants' preferences regarding PHNs. This analysis aimed to determine which persona group preferred PHN1 or PHN2 to answer RQ3.

Interview findings revealed that participants generally found all clips humorous, especially when the content resonated with their personal or cultural experiences, such as themes of

distraction and procrastination in Clip three or insomnia in Clip one. Preferences varied based on personal relatability. Most participants appreciated PHN1 for its simplicity, while a subset found PHN2 more useful for understanding complex cultural references. Some participants noted that PHNs did not enhance their humor appreciation and sometimes distracted from the viewing experience. However, PHNs were noted to improve the understanding of cultural references, indicating a trade-off between cultural comprehension and humor enjoyment.

Regarding RQ3, among thirty-four participants, twenty (59%) preferred PHN1, eleven (32%) preferred PHN2, and three either favored subtitles exclusively or stated their preference was context dependent. Spearman's correlation results ($r_s = 0.04$, $p = 0.83$) showed no significant connection between participants' scores and PHN preferences, suggesting that individual experiences and clip context influenced preferences more than psychological and cultural assessments. This implies that personalization based on these assessments may not accurately predict viewer preferences for subtitling. The absence of persona-preference alignment challenges static persona models in AVT personalization. However, this finding instead supports relevance theory's dynamic view: viewers optimized cognitive effort based on immediate contextual implications (Sasamoto, 2024) rather than stable traits (such as in personality or cultural intelligence).

Participants expressed diverse opinions on the integration of PHNs for humor and cultural reference comprehension. While some appreciated the added context, others felt that additional texts could disrupt their viewing experience, highlighting the challenge of designing subtitling strategies that provide context without overwhelming viewers.

These findings are explored further in Section 5, discussing relevance theory and its application to AVT. The results emphasize the importance of balancing cognitive effects and processing effort, suggesting that subtitling strategies should be tailored to individual experiences and viewing goals to be effective for diverse audiences. The findings underscore the complexity and diversity in individual preferences for subtitle formats, suggesting that while personalization is desirable, its implementation may benefit from more sophisticated approaches.

The interview data also highlighted the importance of the physical placement and presentation of PHNs. Some participants suggested placing PHNs at the bottom of the screen or differentiating them by color to reduce visual strain and cognitive load. Others proposed pausing the video when PHNs appear to allow sufficient reading time without missing scenes. These suggestions point to the potential for optimizing PHNs in future implementations, ensuring they add value without overshadowing the primary content. Collectively, these insights illustrate the complex interplay between viewer preferences, content type, and presentation style in the effective use of subtitles and headnotes in film and television.

5 Discussions of findings

This study contributes to AVT and relevance theory by exploring how personalized headnotes (PHNs) affect humor appreciation and cultural comprehension in subtitled Chinese comedies. While the empirical focus was prioritized, the findings should be interpreted within the broader context of personalization research, relevance theory (Sperber & Wilson, 1986/1995), and subtitling practices.

The data reveal how relevance theory's core principles, particularly the balance between cognitive effects and processing effort, provide a useful lens for interpreting individual differences in PHN preferences. For entertainment-focused viewers (59% preferring PHN1), the domesticated references reduced processing effort by aligning with familiar cultural schemas, yielding sufficient cognitive effects (basic humor comprehension) with minimal exertion. Conversely, educationally motivated viewers (32% preferring PHN2) tolerated higher processing effort for richer cognitive effects (cultural insights), demonstrating how optimal relevance varies by viewing goals.

These patterns align with Sperber and Wilson (1986/1995) that relevance is audience-relative, though we caution against over-application given our methodological focus on observable reception rather than cognitive mechanisms.

Notably, these findings also challenge some assumptions in the literature. While Pérez-González (2013) and McClarty (2012) argue that creative subtitling universally enhances engagement, our eye-tracking data suggest that humor reception follows distinct dynamics. The fragmentation of attention caused by PHNs—particularly evident in eye-tracking data showing shorter fixation durations per character for PHN2—supports Díaz Cintas and Remael's (2007) caution about information overload in subtitling. This tension between cultural accessibility and comedic timing necessitates a more refined approach than current personalization models offer.

In sum, the different effects of PHNs on humor and cultural reference comprehension underscore the complexity of video viewing. The need for viewers to allocate attention among visual action, subtitles, and PHNs can fragment their focus, particularly impacting humor

comprehension, which requires rapid processing. PHN1, being shorter, allowed participants to spend more time per character, while the longer text of PHN2 might have forced viewers to read more quickly, reducing fixation time per character. Additionally, participants' familiarity with SBS compared to PHNs may affect comprehension, as they might struggle to integrate these elements into their viewing experience. This highlights the importance of considering individual reading speeds when implementing PHNs.

The questionnaire results revealed that the introduction of PHNs had a varied impact on the comprehension of humor and cultural references within subtitled content. While PHNs slightly reduced humor comprehension compared to SBS alone, both were perceived as equally effective in enhancing the understanding of cultural references. Interview results supported the notion that participants felt PHNs slowed their reading pace but enriched their comprehension of cultural references, though not necessarily of humor. This discrepancy may be due to the subjective nature of participants' perceptions; while they felt that PHNs improved their understanding of cultural references, this was not always objectively reflected in the comprehension test. Nonetheless, participants' sense of enhanced understanding is valuable as it reflects their personal engagement with the content.

Furthermore, the more positive reception of PHN2 for cultural reference understanding suggests that PHN2 is perceived as an effective tool to bridge cultural gaps, making specific references or jokes more accessible to audiences from different language backgrounds. However, viewer preferences vary between those who favor simpler viewing experiences (PHN1) and those who seek deeper cultural exploration (PHN2). This underscores the need for personalized subtitle settings that cater to diverse preferences.

A critical insight emerges from the disconnect between subjective and objective measures. Participants perceived PHN2 as improving cultural comprehension, yet test scores showed no significant gains. This aligns with Perego et al.'s (2010) warnings about relying solely on self-reports while underscoring the value of mixed-methods designs. The interviews further revealed that PHNs' benefits were context-specific: they enriched cultural understanding but often at the cost of humor's spontaneity. This duality calls for adaptive solutions, such as toggleable headnotes, to accommodate varying viewing goals.

Additionally, RQ3 explored correlations between viewers' pre-task scores on CQS and BFI-S and their PHN preferences. The results indicated that personality traits and CQ levels do not predict headnote preferences. This aligns with previous research indicating that humor appreciation is more influenced by personal experiences and cultural context than genetic factors. Davis (2013) and Yue et al. (2016) highlight the profound cultural underpinnings of humor perception, emphasizing the need for a detailed understanding of humor's role within diverse societal contexts. These insights suggest that humor appreciation and perception are deeply rooted in specific cultural and experiential frameworks. In this research, CQS and BFI-S scales do not play a key role in determining viewer preferences. Instead, the primary driver is the relevance to the individual, such as their personal experience, rather than personality traits or cultural adaptability, as presumed in previous personalization studies. This finding is consistent with the earlier presented data (see Section 4.4), which showed that participants' preference for headnotes was influenced by their viewing goals—whether for enjoyment or education—rather than by their personality or cultural intelligence scores. This underscores the importance of tailoring subtitles and headnotes to the individual's personal experiences and

viewing goals, reinforcing relevance theory's assertion that cognitive engagement is driven by the balance between cognitive effects and processing effort.

The study's surprising finding was the lack of correlation between CQS/BFI-S scores and PHN preferences. This directly challenges persona-based personalization approaches (e.g., Van den Bergh et al., 2015), instead supporting Sasamoto's (2024) dynamic relevance model where immediate viewing context outweighs stable traits. As Davis (2013) and Yue et al. (2016) emphasize, humor perception is rooted in experiential frameworks rather than inherent traits, explaining why personalization must look beyond psychological metrics.

Moreover, the data revealed that viewers seeking entertainment preferred similar and domesticated PHN1, while those with educational objectives favored more authentic and culturally rich headnotes PHN2. This differentiation highlights the necessity of considering the viewer's context and purpose when designing AVT solutions. Hence, it is crucial to focus on personal experiences and individual relevance when developing effective subtitling strategies for diverse audiences. By aligning subtitling practices with the specific needs and preferences of viewers, their overall viewing experience can be enhanced and ensure that the content is both engaging and comprehensible.

Overall, the results indicate that while PHNs can enhance the comprehension of cultural references, their impact on humor appreciation varies according to individual viewer preferences and cultural knowledge. PHN1 was generally preferred for its domesticated and concise explanations, enhancing entertainment without overwhelming the viewer. In contrast, PHN2 was favored by those seeking a deeper cultural understanding. The study shows the need for a more tailored approach to integrating PHNs with subtitled media. PHNs may enhance

cultural understanding, but their influence on humor appreciation is less definitive and varies by individual and context. These findings inform multimedia translation practices, emphasizing the balance between informational richness and viewer enjoyment in international media consumption.

6 Conclusions and limitations

In relevance theoretic terms, this study demonstrates the importance of balancing cognitive effects with processing effort. Viewers preferred PHN1 or PHN2 depending on whether they prioritized entertainment or cultural learning, respectively, reinforcing the view that relevance is highly contextual and user-specific.

The findings highlight the importance of matching translated humor with viewers' knowledge to balance processing effort and cognitive effects. Relevance theory offers a compelling framework for understanding why different viewers respond differently to the same media strategies. Tailoring subtitles and headnotes to viewers' needs enhances the viewing experience, making translations engaging and comprehensible.

The study shows that while subtitles are crucial for basic comprehension, PHNs add cultural depth but may also introduce cognitive strain if not carefully designed. Their influence on enjoyment is complex and depends on factors such as length, placement, and viewer familiarity with subtitle conventions.

Theoretically, this study expands the scope of relevance theory in audiovisual translation, demonstrating its explanatory power for viewer preferences in subtitling. It also questions the

validity of static personalization based on psychometric tools like CQS and BFI-S, showing instead that viewing intent and context are stronger predictors of preference.

From a practical perspective, the research offers subtitling designers and media platforms actionable insight: PHNs can enrich cross-cultural understanding, but must be brief, well-positioned, and optionally toggled to avoid compromising user experience. Pedagogically, these findings are applicable to educators using media in intercultural and translation contexts, showing that PHNs can scaffold learning when designed with cognitive load in mind.

However, limitations remain. The participant sample was relatively small (n = 36), and culturally homogeneous. Humor comprehension was evaluated through self-report, facial mirth, and comprehension tests, which may not fully capture its multifaceted nature.

Future research could explore the development of viewer-controlled subtitle and headnote systems, allowing audiences to toggle cultural explanations according to their preferences or cognitive needs. Additionally, it would be valuable to investigate how PHNs function across different media genres, such as dramas or documentaries, where pacing and tone differ significantly from comedy. Another promising direction involves assessing the long-term impact of PHNs on cultural learning, to determine whether brief on-screen annotations contribute to deeper or more lasting intercultural understanding. Researchers may also consider employing neurocognitive tools to gain more fine-grained insight into viewers' cognitive processing during subtitle reception. Finally, examining how PHNs perform in real-world streaming environments—where attention is divided and viewing conditions vary—will help assess their practicality and scalability for broader audience use.

In conclusion, PHNs show potential for bridging linguistic and cultural divides, particularly in subtitled media. Yet, to be effective, they must be viewer-centric, relevance-informed, and contextually appropriate. This study offers a model for integrating personalization, relevance theory, and user feedback in subtitling, pointing the way toward more responsive and inclusive translation practices.

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Notes

1. See appendices for details of the pre-task and post-task questionnaires.

2. This research focused on observable mirth, excluding micro expressions. All instances were recorded by direct visual inspection, so subtle expressions may have been missed.