Research Report

Exploring the Effects of Personal Information in Television News

A Cognitive Approach

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Abstract: We report the results of an experiment in which participants (N = 41) watched a number of television news clips containing either personal or professional stories about celebrities, while measures of information encoding, storage, and retrieval were collected together with psychophysiological measures of autonomous nervous system activity. The results show that the presence of personal information elicits attentional resources allocation and improves memory for contents, suggesting that personal information benefits from a deeper cognitive processing compared with professional information. These findings provide preliminary evidence on the cognitive effects of personal information that encourages further research on several dimensions of media use such as fandom or gossip media from a cognitive point of view.

Keywords: personal information, attention, memory, psychophysiology, gossip

Information about the personal affairs of famous people has an overwhelming presence in the media landscape – usually in the form of celebrity gossip – and audiences show a marked interest in the lives of people they will probably never meet and in events that have no bearing on their daily matters (Turner, 2004). However, and rather surprisingly, research on media psychology has seldom analyzed the effects of personal information in terms of its effects on cognitive processing.

In the present report, we argue that information on personal affairs of famous people is, due to its motivational relevance, preferentially processed by our cognitive system. We report the results of an experiment providing preliminary support of this hypothesis in the context of celebrity news and discuss possible next steps for further research in this topic.

Personal Information, Motivational Relevance, and Information Processing

Although everyone has a notion of what personal information is, the literature in the field has yet to provide a formal definition of personal information. In general terms, personal information is information about individuals that is not about their professional activities and includes aspects of their social relationships or private circumstances (e.g., health or socioeconomic status) that have an impact on social life.

The exchange of personal information is a defining characteristic of gossip (Foster, 2004). Various authors have considered gossip as a mechanism with an evolutionary basis that has the function of facilitating the exchange of information that is important for group bonding (Dunbar, 2004) or social learning (Baumeister, Zhang, & Vohs, 2004). Therefore, if gossip has such an adaptive function, it seems plausible that our cognitive systems would prime the processing of information serving that function (i.e., personal information), in a similar way in which it favors the processing of other kinds of motivationally relevant information (Lang, 2006). Although one may consider some media contents as *professional gossip* a quick glance at gossip-related media promptly shows that the more personal the information, the higher the interest it elicits. This goes in line with theories of interpersonal communication such as social penetration theory (Carpenter & Greene, 2016) or communication privacy management theory (Petronio & Durham, 2008), which assign a higher intrinsic informational value to information about people as it gets more personal. And it is precisely this higher informational value that leads to a possible operationalization of this concept, its motivational relevance.

Motivational relevance refers to the extent to which information contained in a stimulus represents an opportunity

or a threat (Lang, 2006), and it has effects on the way information is processed and remembered by the audience. Such effects have been examined primarily within the theoretical framework of the limited capacity model for motivated mediated message processing (LC4MP; Lang, 2006). Within this framework, motivationally relevant information is often operationalized through measures of processing such as performance on the secondary reaction time task (STRT), or through self-reported or physiological measures of sympathetic activation, often referred to as arousal. Arousing contents require more resources to be processed, resulting in slower reaction times in a Secodary Task Reaction Time (STRT) test, but also improve information encoding, storage, and retrieval, which is evidenced in better results in recognition, cued recall, and free recall tests, respectively (e.g., Lang, Park, Sanders-Jackson, Wilson, & Wang, 2007). If personal information, as the object of gossip, represents an opportunity for learning social norms (Baumeister et al., 2004) or controlling free-riders (Dunbar, 2004), it can be considered as motivationally relevant, and then news containing personal information will produce (Hypothesis 1, H1) slower STRTs, (Hypothesis 2, H2) better recognition of story information, along with better (Hypothesis 3, H3) cued recall and (Hypothesis 4, H4) free recall of story information, compared with news containing only professional information.

Motivational relevance affects the activity of both the sympathetic and the parasympathetic branches of the autonomous nervous system (Bradley, Codispoti, Cuthbert, & Lang, 2001). Sympathetic activation is associated with increases in electrodermal activity (EDA) levels, while parasympathetic activation has been related to phasic decreases in heart rate (HR) and increases in heart rate variability (HRV; Laborde, Mosley, & Thayer, 2017). Therefore, we also expect that when compared with professional news, personal news will be (Hypothesis 5, H5) positively associated with EDA level, (Hypothesis 6, H6) negatively associated with HR, and (Hypothesis 7, H7) positively associated with HRV.

Method

We conducted an experiment in which we asked participants to attentively watch a number of television news stories about celebrities, including stories about personal affairs and stories about professional affairs.

Materials

We selected 20 stories with a duration of between 27 and 95 s (M = 70.1; SD = 19.37) from actual television programs, all of them about very famous and well-known national or international celebrities, including four Hollywood actors, three singers, one international model, one football player, and one cinema director. For each celebrity, one story on personal affairs and one story on professional affairs was included. Personal stories were about celebrities getting married (two stories), their bad relationships with relatives or ex-partners (five stories), the birth of a child (one story), the death of one celebrity's son (one story), and one celebrity admitting he is gay (one story). Professional stories were about the release of a new album or movie (three stories), a new concert (two stories), a movie shooting (one story), a new advertising campaign (one story), or the celebrity receiving an award or acknowledgment (three stories).

The formal structure of all of them included the presentation of an edited video with a voice-over narration. There was not a significant difference in their mean duration between personal (M = 65.6; SD = 21.72) and professional (M = 74.5; SD = 16.53) stories, $t(18) = 1.03$, $p = .31$, $d = 0.46$. Regarding the pace of camera changes, measured in camera changes per second, there was no significant difference between personal (M = 0.33; SD = 0.15) and professional (M = 0.46; SD = 0.29) stories, $t(18) = 1.34$, $p = .20$, $d = 0.60$.

Stimuli Pretest

We asked 48 participants (26 women) aged between 19 and 30 years (M = 20.23; SD = 1.99) who watched the 20 stories to rate their agreement with the sentence, "This piece of news is about personal information" on a 7-point Likert-type scale, ranging from 1 (= *not at all*) to 7 (= *totally*), in order to obtain a measure of the level of personal information of each story. Participants in the pretest also rated how each story made them feel in terms of emotional arousal and valence using the 5-point Self-Assessment Manikin (SAM) Scale (with a bipolar scale for valence).

The mean scores for personal information, arousal, and valence for each story in the sample were calculated, and, in order to compare the two groups of stories, two-sample t tests were applied. The level of personal information was significantly higher in personal stories (M = 5.92; SD = 0.22) than in professional stories (M = 3.19; SD = 0.71), $t(18) = 11.61$, $p < .001$, $d = 5.19$, but there were not significant differences in terms of arousal (M = 2.27; SD = 0.72 for personal stories; M = 2.13; SD = 0.47 for professional stories), $t(18) = 0.53$, $p = .60$, $d = 0.24$. Personal stories (M = 2.59; SD = 0.59) were seen as more negative than professional stories (M = 3.18; SD = 0.47), $t(18) = 2.49$, $p = 0.02$, $d = 1.11$.

Dependent Variables

EDA

Participants' EDA was collected during the viewing of the materials, by placing two electrodes in the middle phalanx

of the index and middle fingers of the participant's non-dominant hand.

HR and HRV

An electrocardiogram (ECG) of the participants was obtained during the viewing sessions, from which the HR and HRV were calculated. Although other alternatives are available (Keene, Clayton, Berke, Loof, & Bolls, 2017), since we focus on tonic effects, HR was measured in beats per minute (bpm). The unit for HRV measurement was the root mean square of successive differences (RMSSD; Laborde et al., 2017). In order to collect the ECG, two electrodes were placed on the non-dominant forearm (one on the wrist and one near the elbow) and one on the wrist of the dominant hand.

STRT

Seven tones were inserted in pseudo-random positions in each story, except in the case of the two shortest news clips, in which only five tones were inserted. They consisted of a sinusoid waveform with a frequency of 1,000 Hz and a duration of 0.2 s. Their positions varied for each story and each participant, but in all cases they were placed at least 2 s after the beginning of the video and there was a separation of at least 3 s between tones.

Recognition

A forced choice (*Yes/No*) auditory recognition task included three 2-s excerpts of the audio of each story, embedded in a similar number of segments of other similar stories about other celebrities not included in the experiment. Participants were asked to detect whether or not each segment had appeared in the viewed materials.

Cued and Free Recall

Approximately 48 hr after the experiment, a researcher telephoned the participants in order to conduct the cued and free recall tests. The free recall test involved asking the participant to mention the topics of the stories that he or she could recall. Immediately after this, participants carried out the cued recall test, in which they answered two questions about specific details of each story.

Participants and Procedure

The participants of the experiment comprised 41 volunteers[1] (20 women) aged between 18 and 42 years (M = 25.17; SD = 5.95), who received a gift card as compensation. Each participant completed the experiment individually, seated in a comfortable chair in an isolated room. After signing an informed consent form, participants were told that they were going to take part in an experiment about the perception of news. They received instructions for the secondary task, and watched a training news reel to habituate to it. The videos were presented on a computer screen in random order using the *Psychopy* software (Peirce, 2007), which also collected the STRTs. A 5-s-long gray screen was used as a separator between stories. Psychophysiological measures were collected using the Biopac MP-150 system and the Acqknowledge 4.2 (Biopac Systems, Inc.) software (1,000 Hz sampling rate). After the viewing, participants completed the recognition task and, approximately 48 hr later, participants were phoned to answer the free and cued recall questionnaires.

Data Preprocessing

Owing to technical issues, the complete physiological recordings of two participants, and the recordings for three stories for one participant, were lost. The ECG for six stories belonging to four participants presented a noisy signal in which heart beats were not properly identifiable, and therefore they were discarded. Thus, the final sample consists of EDA recordings for 777 stories, and ECG recordings for 771 stories, from 39 participants.

EDA and HR (obtained from the ECG) were downsampled to 1 Hz. RMSSD was calculated for each second of the story using a 10-s sliding window with 90% overlap (Laborde et al., 2017), over the ECG signal (thus leaving aside the first and last 5 s of each story), in order to obtain a temporal series of HRV. Thus, the data submitted to the analysis are a temporal series, with a 1-Hz resolution, of EDA, HR, and HRV.

For STRT data, values over 2 s were considered outliers and removed. For the recognition test, the percentage of hits for each participant and story was calculated. In the case of the cued and free recall tests, eight participants did not take the phone call, and thus the data contain the responses from 33 participants. Two researchers evaluated each response of the participants to the tests, and rated it as correct or incorrect. Inter-coder agreement was good in both the cued and free recall tests (Krippendorff's α of 0.82 and 0.98, respectively). In the cases in which the two coders disagreed, only responses assessed as correct by both coders were considered a valid correct response. Therefore, the data considered in the analyses are: for STRT, the response times for each beep for each participant in each story; for the recognition test, the percentage of correct responses of each participant for each story; for the cued recall test, a binary value (0/1) describing whether

[1] Even though a priori statistical power tests were not conducted, the within-subject experimental design applied, in which each participant watched 10 stories per condition (personal/professional), with 41 participants, gives a sample of 820 viewings (410 per condition), which was considered a reasonable sample size.

the participant provided or not a correct response to each question about each story; and, for the cued recall test, a binary value for each story for each participant, describing whether or not the participant recalled that story.

Data Analysis

In this section, the procedure for the analyses of the data for the different dependent variables is described. The intraclass correlation coefficients (ICC) suggested that in all cases a significant proportion of the variance in all the dependent variables was explained by individual differences (ICC-EDA = 0.90; ICC-HR = 0.78; ICC-HRV = 0.97; ICC-STRT = 0.37; ICC-Recognition = 0.29; ICC-Cued recall = 0.57; ICC-Free Recall = 0.56). Mixed multilevel models were used for the analysis, and logistic mixed multilevel models in the case of the cued and free recall data. For each variable, a null model without fixed factors was fitted including a random intercept for participants. In the cases in which they significantly improved model fitting according to a likelihood test, a random intercept for celebrities per participant (since different individuals may have different attitudes toward different celebrities) and an autocorrelation function for modeling error structure were added to the models. This was the case of the models for EDA, HR, HRV, and STRT.

Departing from the null model with random terms and autocorrelation of errors, for each psychophysiological variable (EDA, HR, and HRV), two more models were fitted. Model 1 (M1) consisted in adding to the null model the following variables as fixed factors: arousal and valence ratings for each story (resulting from the average values from the pretest), story pace, time (ranging from the first to the last measure for each of the story), and participant's gender and age. Model 2 (M2) was similar to M1, but included the type of story as a fixed factor. M1 and M2 were compared using a likelihood test, in order to test the effects of type of story over the dependent variables while controlling for the effects of the rest of possible covariates.

For the STRT, recognition, cued recall, and free recall, the same approach was followed, with the exceptions that, instead of time, the temporal position of beeps was included in the STRT models, and no variable reflecting time was included for the recognition, free, and cued recall models.

Results

Including the type of story variable significantly improves model fitting for STRT, $\chi^2(1) = 5.26$; $p = .02$, cued recall, $\chi^2(1) = 12.32$; $p < .001$, free recall, $\chi^2(1) = 12.25$; $p < .001$, HR, $\chi^2(1) = 4.19$; $p = .04$, and HRV, $\chi^2(1) = 43.1$; $p < .001$, models. The coefficients shown in Table 1 indicate that personal stories are associated with significantly higher STRT, better cued and free recall, lower HR, and higher HRV, which provides support for H_1, H_3, H_4, H_6, and H_7, respectively. However, including the type of story variable did not improve model fitting in the cases of EDA, $\chi^2(1) = 0.92$; $p = .33$, and recognition data, $\chi^2(1) = 0.53$; $p = .46$, and the coefficients for this variable are not significant in either EDA or recognition models (Table 1). Therefore, H_2 and H_5 were not supported.

Table 1. Summary of Model 2 for all the dependent variables

	STRT	Recognition	Cued recall	Free recall	EDA	HR	HRV
Fixed factors							
Intercept	502.05***	0.81***	−3.02***	−1.1	5.54	75.31***	540.11***
Type of story	7.61*	0.01	0.48***	0.71***	−0.03	−0.32*	7.21***
Arousal	10.4***	0.09***	0.47***	−0.04	0.03	−0.37**	8.1***
Valence	15.66***	−0.01	0.54***	−0.07	0.04*	0.46***	−5.48***
Pace	−16.21*	−0.06	−0.56	0.17	0.37***	−0.82**	−4.3**
Time					−0.002***	−0.01***	0.02
Beep	−5.13***						
Age	0.45	−0.01	0.01	0.00	0.16	−0.03	−0.47
Gender	18.8	−0.02	0.36	0.42	−0.26	0.43	181.19
Random terms							
Celebrity/Participant	15.52				0.5	0.01	0.016
Participant	57.21	0.09	0.61	0.57	4.3	10.01	200.79
Residuals	95.59	0.22	0.46	0.44	1.16	5.24	35.79
n observations	5,474	820	1,320	660	55,086	54,622	46,758
n groups (celebrity/participant)	410				389	389	388
n groups (participants)	41	41	33	33	39	39	39

Note. The coding for Type of story is 0 = professional, 1 = personal. Coefficients of the STRT, recognition, free recall, cued recall, EDA, HR, and HRV models are expressed, respectively, in ms, percent of hits, log-odds ratio, log-odds ratio, μS, bpm, and ms. EDA = electrodermal activity. HR = heart rate. HRV = heart rate variability. STRT = secondary task reaction time. *$p < .05$. **$p < .01$. ***$p < .001$.

Regarding the control variables, arousal was associated with significant increases in STRT, recognition, cued and free recall, and HRV, and with decreases in HR, while valence produced significant increases in STRT, cued recall, EDA, and HR, and decreases in HRV. Pace was positively associated with EDA, and negatively associated with STRT, HR, and HRV, and did not have significant effects on recognition and recall. Time was associated with significant decreases in EDA and HR, but not in HRV. Age did not show any significant effect on any of the variables, while gender only had a significant effect on HRV.

Discussion

The rationale underlying this study was that, if personal information has motivational relevance, it should produce similar effects on cognitive processing as emotionally arousing contents do. The results support this assumption only partially. We found that personal stories enhance the allocation of cognitive resources to the processing, are better stored and retrieved from memory, and require more resources to be encoded. However, personal news did not produce any significant effect on EDA levels or information recognition. This suggests that, although personal information may not have motivational relevance in the same sense that, for instance, other arousing contents, it has clear effects on attention and memory for the information.

The significant effects on HRV and the lack of effects on EDA indicate that only the activity of the parasympathetic nervous system was modulated by personal information. Since parasympathetic activity is associated with attentional focus and information intake, while sympathetic activity is related to mobilization and action preparation, we suggest the following putative explanation for these results: Personal information is important for the social group, and hence deserves attention (leading to parasympathetic activation), but it is unlikely to require an immediate action (like stimuli related to violence or sex, for instance, may require), therefore there is no need for sympathetic activation. On the other hand, the lack of effects of type of story on recognition, together with its significant improvements on cued and free recall, suggest that personal information does not increase the quantity of information encoded, but merely improves how it is stored and retrieved from memory.

In order to control for individual differences in disposition toward celebrities, random intercepts for participants and for celebrities per participant were included in all models when they improved model fitting. Moreover, the sample contained stories from 10 different celebrities. Hence, the effects found in the analysis can be considered as general effects in the sample of participants and are not attributable to individual dispositions (e.g., in terms of fandom or parasocial relationships).

The effects of personal stories were significant even when controlling for aspects of the messages such as arousal, valence, and pace, and individual characteristics such as age and gender. One possible limitation is that, according to the pretest ratings, personal stories were more negatively valenced, but the fact that valence was controlled in the models dismisses the possible confounding of these variables in our results. Furthermore, according to the pretest scores, the difference in personal information between personal and professional stories was much larger (Cohen's $d = 5.19$) than the difference in valence (Cohen's $d = 1.11$). Therefore, it is unlikely that the effects found for the type of story are attributable to a confusion with valence.

Taken together, our results support the view that higher levels of personal information have specific effects on attention and memory, regardless of other attributes of the message or the audience. This of course does not preclude that individual differences, as well as other facets of the message, may moderate these effects; in fact, how this general effect is shaped by those possible interactions is a fruitful trail for future research.

Some limitations of this study are that we only tested the effects of personal information of celebrities, and that the measurement of personal information in the pretest may oversimplify the possible different dimensions underlying the concept. Further research should extrapolate these results to messages related to anonymous people, examine more deeply the concept of personal information in media, and also examine other aspects not regarded here, such as the possible effects of the coincidence (or lack of) in gender between the depicted character and the viewer. Other limitations are that we did not assess aspects such as whether personal information produces specifically appetitive or aversive activation, or if visual recognition may produce dissimilar results to the ones found on auditory recognition. We did not examine other possibly different effects of personal and professional information over the duration of the viewing; the role of previous knowledge about the celebrities on information processing; as well as that other possible explanations for the fact that we found significant effects of personal information in storage and retrieval, but not in recognition, which might be due, for instance, to a ceiling effect (as suggested by the high value intercept of the recognition model, indicating a mean recognition of above 80% of the auditory excerpts, regardless of the type of story).

Conclusion

Despite its limitations, the present work provides preliminary evidence of the specific effects of personal information

from a cognitive and experimental perspective, which should be expanded by future work to explore the aforementioned aspects as well as other implications. For example, in the context of political information, it would be interesting to address the question of whether the presence of details on personal facets of political candidates, since it might increase attention, might also increase memory for political information (and not only for personal information).

Research Transparency Statement

The authors are not willing to share their data, analytics methods, and study materials with other researchers.

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