

## **See me, feel me, impulse buy me. An analysis of physiological and behavioural responses to unplanned and impulsive online purchases**

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### **Extended abstract**

Impulse buying (IB) has embodied a pivotal subject matter in the field of consumer research for several decades (Stern, 1962; Rook, 1987). The extant literature commonly interprets the phenomenon as a multifaceted behaviour involving a lack of pre-shopping intentions, a short-terministic decision-making triggered by a compelling urge to purchase and an emotional conflict due to its hedonic content, leading to regret in the post-purchase (Piron, 1991; Rook and Fisher, 1995; Wood, 1998; Dittmar and Drury, 2000). Originally observed in the offline context, impulsive buying urges have gained further upswing due to the spreading of e-commerce activities (Chan et al., 2017). Internet-enabled platforms offer indeed the chance to perform purchases as soon as impulsive urges to buy arise by offering greater product accessibility, uncomplicated purchasing dynamics (e.g. 1-Click ordering), and delivery convenience in an environment often devoid of social pressures. On its flip side, online IB is often cause of higher product return rates bearing significant impacts on financial returns and logistics costs in digital marketplaces (Park and Lennon, 2006; Kang and Johnson, 2009). Due to its significant economic and social relevance, online IB studies have attracted the attention of practitioners as well as academics, exploring the phenomenon in terms of digital platforms design (Parboteeah et al., 2009; Liu et al., 2013) or situational moderating variables (Parguel et al., 2017; Hu et al., 2019).

In the extant literature pertaining to economics and psychology, a sizable amount of published studies appears to be often limited to surveys aimed at directly inquiring subjects on their thoughts, feelings, and contextual evaluations, often discounting the underlying automatic and implicit mechanisms

driving the action beyond consciousness (Iyer et al., 2019). To overcome such a limitation, a few studies adopted a distinct approach, gauging IB from the behavioural and neurophysiological responses of the subjects. These include the evaluation of ocular patterns and pupil dilation (Huang and Kuo, 2012; Serfas et al., 2014; Khachatryan et al., 2018), facial expressions (Weinberg and Gottwald, 1982), or sub-cortical neural activations (Hubert et al., 2013; Hubert et al., 2018) to specific recreated fictitious buying situation. Building on such existing evidence, the present work is intended to characterise the physiological and behavioural responses occurring during an ecologically valid act of online impulse purchase.

Relying on previous theoretical conceptualisations, we hypothesise that, respectively to a traditional purchasing act, IB is (*H1*) positively influenced by hedonic personality traits (Beatty and Ferrell, 1998), (*H2*) characterised by higher product involvement (Jones et al., 2003), (*H3*) prompts higher physiological arousal and (*H4*) approach tendencies (Rook, 1987), and (*H5*) leads to regret and cognitive dissonance during the post-purchase (Spiteri Cornish, 2020). To test our hypotheses, we adopt a dichotomic conceptualisation of IB, discerning between Unplanned Purchasing (UP) and Impulse Spending (IS) components. UP represents the facet related to a lack of a clear intention or preplanning associated to the purchase of a specific item, brand, or product class (Kollat and Willett, 1967; Cobb and Hoyer, 1986). While IS embodies the reactive behaviour triggered by urges to buy immediately or by alluring desires linked to product proximity (Rook and Hoch, 1985; Beatty and Ferrell, 1998). Consequently, we conjecture that IB behaviours display both UP and IS traits.

We carried out an experimental investigation involving 76 healthy right-handed subjects (44 women, 32 men,  $M_{\text{age}}=32.99$ ,  $SD = 13.23$ , age range 19-64 years). The employed experimental design was conceptualised according to previous IB investigations (Vohs and Faber, 2007; De Vries and Fennis, 2019) and involved six sequential phases. Initially, subjects underwent a digital version of the Balloon Analogue Risk Task, to assess the individual risk-taking propensity, and filled in a behavioural avoidance/inhibition scale (Carver and White, 1994; Leone et al., 2002). Consequent to completion, each subject received a physical Amazon voucher worth € 9.00. Subjects were then invited to the

experimentation room where physiological measurement instrumentation was set up and were exposed to a series of distractor videos. In the third phase, subjects underwent a digital Stroop Color and Word Test (MacLeod, 1991), employed as a mean to deplete individual cognitive resources (Baumeister, 2002). Upon completion, each subject received a second € 9.00 digital voucher to be spent in the following phase. The fourth phase concerned the act of online purchase, namely subjects were directed to the official Italian Amazon website on the Offers section and were granted the possibility to perform a real purchase of any desired item. Each subject faced the possibility to (i) search and purchase a single product priced up to € 9.00, employing the digital voucher and pocketing the physical one; (ii) search and purchase a single product priced up to € 18.00, spending both vouchers; (iii) not to perform any purchase, dropping the digital voucher but pocketing the physical one. To recreate the IB process conditions, subjects were requested to perform their potential purchase in 2 minutes, after which subjects' choice would have fallen into option (iii). A digital survey was then employed to gather self-reported measures of IB and related antecedents. Lastly, two days after each experimental session, a digital survey assessing regret and cognitive dissonance was sent via email to the subjects who performed a purchase.

During each session three different signals were acquired, namely (i) electroencephalogram (EEG) through a portable system equipped with a 64-channels pre-cabled cap, where 27 chosen electrodes were activated, recording at a sampling rate equal to 256 Hz; (ii) a pair of finger electrodes to gauge the electrodermal activity (EDA) recording at a sampling rate of 256 Hz; and (iii) Eye-tracking signal through a remote eye-tracking bar attached to the computer monitor, recording at a sampling rate of 60 Hz.

Muscular and ocular artefacts were identified and removed from the EEG signal through independent component analysis using detection through predefined topographies and the resultant signal was processed to compute attention, memorisation, approach-withdrawal (Vecchiato et al. 2011; Vecchiato et al. 2012), and engagement indexes (Coelli et al., 2015). EDA signals were processed by deconvolution and decomposed into continuous phasic and tonic components using Ledalab toolbox

on Matlab (Benedek and Kaernbach, 2010). Two main parameters were calculated through continuous decomposition analysis, namely tonic activity and ISCR, as the time integral of phasic drivers. Eye-tracking signal was employed to detect the instants of the first fixation on the bought product and to assess four windows of analysis, corresponding to (i) exploration phase, (ii) catch phase, as the 4 seconds window following the identified first fixation, (iii) consideration phase, as the period between the first fixation and the purchasing action, and (iv) purchase phase, as a 4 seconds window following the purchasing action. According to Vohs and Faber (2007), IS was measured via a dichotomous variable reflecting the willingness to impulsively employ both vouchers received for immediate purchase. Whereas UP was assessed through self-reporting as in previous studies (Stern, 1962; Kollat and Willett, 1967). The condition of IB was calculated as the combination of both IS and UP.

After assessing the independence between IS and UP, multiple independent-samples tests were run to determine if there were differences in IS, UP, and IB. Results revealed that subjects engaging in IS displayed more pronounced hedonic personality traits (i.e. Hedonic Consumption tendencies and Reward Responsiveness) and experienced higher physiological arousal in the exploration, catch and purchase phases. Differently, participants performing UP displayed higher product involvement, behavioural inhibition, and reported higher cognitive dissonance and regret in the post-purchase. Lastly, subjects engaging in IB resulted to be characterised by marked hedonic personal traits, experienced higher physiological arousal along the purchasing process, as well as higher reported cognitive dissonance and regret in the post-purchase. Binomial logistic regressions were then performed to ascertain the effects of behavioural traits, physiological responses, and product characteristics on the likelihood that subjects performed IS, UP and IB. All models were statistically significant, with variances explained respectively equal to .589 (IS), .509 (UP), .656 (IB) (Nagelkerke  $R^2$ ) and correctly classifying 79.6% (IS), 81.4% (UP) and 88.6% (IB) of cases. From the predictor analysis emerged that IS was positively triggered solely by personal dispositions and physiological arousal in the catch phase. UP resulted to be affected both by Product Involvement and subject's age.

Whereas IB was elicited by marked hedonic personal traits, subject's age and physiological arousal in the purchasing phase.

Together these results highlight that the process of online IB stems from a combination of Impulse Spending traits, mainly driven by personality traits and physiological arousal, and Unplanned Purchasing actions, triggered by product characteristics and younger age, which results in post-purchase guilt. These results corroborate previous findings concerning personality traits (H1), product involvement (H2), physiological arousal (H3), and subsequent post-purchase regret and cognitive dissonance (H5). Notably, our results underscore that IB may not be characterised by heightened physiological attraction along the purchasing process nor that is triggered by peculiar information search patterns. A recurring theme that emerges from these findings is related to the existence of a contradiction between self-perception of individual impulsivity and actual impulse buying behaviour, a leitmotif for research methods aimed at assessing latent purchase intentions.

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