

The Psychological Impact of Digital Signatures: A Multistudy Replication

Kallie Tzelios and Lisa A. Williams

School of Psychology, University of New South Wales



Despite increasing adoption of digital signatures, research has suggested that doing so may carry deleterious social consequences. Prior research established that documents signed electronically are deemed to convey less social presence than those signed by hand, which in turn negatively impacts social judgments. This article reports the results of two preregistered close replication studies (total $N = 311$) and a meta-analysis spanning the original study and these new studies. Robust support emerged for previously documented psychological consequences of digital signatures. Signers using an avatar were rated as less socially present and were perceived to be more likely to breach the signed contract than those who had hand-signed the document. Further, the indirect effect of signature type on perceived likelihood of contract breach via social presence was nonzero in all samples. These studies add to the growing literature on the psychological impact of digital signatures and carry both practical and theoretical implications.

Keywords: digital signatures, social presence, technology, social judgment

From business contracts to leases, individuals sign legal documents with digital signatures rather than by hand with increasing frequency. Leading technology companies such as Adobe (USD \$11.17 billion in revenue in 2019) and DocuSign (USD\$974 million in revenue in 2019) vie for market share while countries worldwide grapple with the legal implications of digital signatures (Crook, 2018; Laborde, 2010; Mason, 2012; Pichler & Tomić, 2019). One concern with digital signatures is that people may harbor hesitations regarding their social value, thus undermining enthusiasm for their uptake (Srivastava, 2011).

In a series of seminal studies, Chou (2015a) put this question to empirical test, leveraging the concept of social presence (i.e., inferred psychological involvement; see Biocca et al., 2003 for a review). The concept of social presence has been applied to understand and enhance the dynamics of technology-mediated interaction in a variety of settings, including consumer (e.g., Lu et al., 2016; Osei-Frimpong & McLean, 2018) and educational (e.g., Dunlap & Lowenthal, 2009; Kehrwald, 2008; Richardson & Swan, 2003; Swan & Shih, 2005) contexts. Biocca and colleagues (2003) highlight a key theoretical aspect to social presence: It sits at the nexus of technological (i.e., aspects of the medium) and psychological (i.e., aspects of the user) dynamics. Digital signatures are one rather new technology resting at this nexus, thus presenting an intriguing context for the study of social presence dynamics.

Leveraging the idea that handwritten signatures convey high social presence via their symbolic representations of identity (Kettle & Häubl, 2011), Chou (2015a) reasoned that digital signatures may signal less social presence, guiding more negative judgments of the digitally signed document. Indeed, across several studies, a robust pattern emerged whereby documents signed digitally were viewed more negatively than documents signed by hand. For instance, in Study 3b, participants felt that a digitally signed contract would be more likely to be breached than that same contract signed by hand. Further, this effect was mediated by social presence: Digital signatures were perceived to convey less social presence of the signer, which, in turn, guided increased judgments of contract breach.


Given the rising adoption of digital signatures, the replication of these effects is of both theoretical and practical import. This article reports the results of two preregistered studies (total $N = 311$) attempting to replicate the previously observed effects of digital signatures on social presence, and, subsequently, social inferences. Study 1 included two undergraduate student samples and Study 2 utilized an online community sample. All methods and analyses were preregistered. Preregistrations as well as data and analysis


Action Editor: Danielle S. McNamara was the action editor for this article.


ORCID iDs: Kallie Tzelios  <https://orcid.org/0000-0001-6682-1889>; Lisa A. Williams  <https://orcid.org/0000-0002-0021-5613>.

Disclosures and Acknowledgments: We have no conflicts of interest to disclose. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Open Science Disclosures:

 The data are available at <https://osf.io/85ctb/>

 The experimental materials are available at <https://osf.io/85ctb/>

 The preregistered design is available at <https://osf.io/85ctb/>

Open Access License: This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](#) (CC-BY-NC-ND). This license permits copying and redistributing the work in any medium or format for noncommercial use provided the original authors and source are credited and a link to the license is included in attribution. No derivative works are permitted under this license.

Disclaimer: Interactive content is included in the online version of this article.

Contact Information: Correspondence concerning this article should be addressed to Lisa A. Williams, University of New South Wales, School of Psychology, Sydney, NSW 2052, Australia. Email: lwiliams@unsw.edu.au

syntax can be found at <https://osf.io/85ctb/>. Procedures were approved by the University of New South Wales Human Research Ethics Advisory Panel.

Study 1

Study 1 was designed to assess the replicability of the effect of avatar signatures on contract breach judgments relative to handwritten signatures, as reported by Chou (2015a; Study 3b). Whereas the original study included five digital signature formats, this close replication attempt utilized the avatar signature. The decision to utilize only one digital signature format was made in light of anticipated sample sizes, which were to be substantially smaller than that of the original study. The avatar signature was selected due to the largest observed effects on social presence and perceived likelihood of contract breach relative to handwritten signatures [for the latter, the effect size for avatar signatures was equivalent to three other digital signature formats (a typed name, a PIN, or a checked box) relative to handwritten signatures].

Study 1 involved two time-based samples, each collected as part of an undergraduate course in social psychology at a large Australian university. The aims of the study had not been revealed to students prior to data collection. Study materials were derived from methods reported in the study by Chou (2015a) and in email communications with the author.¹

Method

Participants

Students enrolled in an upper-level undergraduate psychology course were invited to complete the study voluntarily (Sample A: $n = 67$ out of 152 students invited accepted the invitation and Sample B: $n = 53$ out of 160 invited accepted the invitation); no compensation was offered nor was participation assessed as part of course completion. Of students who accepted the invitation to participate in the study, preregistration exclusion criteria were applied. These criteria excluded participants who

1. started but did not complete the survey,
2. reported issues with survey progression,
3. reported that they could not see the contract images,
4. reported that they knew substantive details about the study before participating, and/or
5. reported that they were not currently a student in the course in which data collection occurred.

Applying these criteria resulted in the exclusion of 18 participants from Sample A and 19 from Sample B. Thus, the analyzed Sample A comprised 49 participants (77.6% female; $M_{\text{age}} = 21.56$ and $SD_{\text{age}} = 2.77$; 51.0% White/Caucasian and 40.8% Asian) and the analyzed Sample B included 34 participants (73.5% female; $M_{\text{age}} = 20.82$ and $SD_{\text{age}} = 1.06$; 29.4% White/Caucasian and 50.0% Asian).²

Procedure

After providing informed consent, participants were informed that they would be viewing and evaluating a lease contract.

Participants were randomly assigned to view a lease contract signed with an avatar digital signature ($n_{\text{Sample A}} = 21$ and $n_{\text{Sample B}} = 13$) or via hand ($n_{\text{Sample A}} = 28$ and $n_{\text{Sample B}} = 21$). Participants then rated the signer's social presence (four items: "How involved do you think the signer was when s/he signed this document?," "How attentive do you think the signer was when s/he signed this document?," "How much do you think the signature captures the signer's expressed intent?," and "How much do you think this signature is provided by another human being?") $\alpha_{\text{sample A}} = .84$ and $\alpha_{\text{sample B}} = .77$) and the perceived likelihood that the signer would breach the contract (four items: "How likely do you think it is that this signer will break the contract?," "The signer will think twice before breaching the contract because of this signature," "The signature reduces the signer's likelihood of cheating," and "The signature is legally valid.") $\alpha_{\text{sample A}} = .77$ and $\alpha_{\text{sample B}} = .62$). These items were rated on five-point scales anchored by *not at all* and *extremely*. Prior to providing demographic information, participants rated their comfort with current technology trends (single-item) on a five-point scale anchored by *not at all* and *very much so*.

Results

Sample A

Replicating Chou (2015a; Study 3b), participants rated the avatar signature ($M = 2.67$ and $SD = 0.94$) as lower in social presence than the handwritten signature ($M = 3.32$ and $SD = 0.86$), $F(1, 46) = 6.43$, $p = .02$, $\eta_p^2 = .12$, 95% CI of mean difference $[-1.18, -0.14]$, and controlling for comfort with technology ($p = .62$). Further, as expected, participants perceived signers using an avatar signature ($M = 3.27$ and $SD = 0.87$) to be more likely to breach that contract than signers signing by hand ($M = 2.50$ and $SD = 0.89$), $F(1, 46) = 9.10$, $p = .004$, $\eta_p^2 = .17$, 95% CI of mean difference $[0.26, 1.30]$, and controlling for comfort with technology ($p = .69$).³ The indirect effect of avatar versus handwritten signature on perceived likelihood of contract breach via social presence was significant (estimate = $-.31$, standard error = $.12$ and 95% CI $[-.63, -.12]$), as estimated via 10,000 bias-corrected samples computed in the PROCESS macro (v 2.16; Hayes, 2013).

¹ We wish to thank Eileen Chou for providing methodological details as well as the descriptive data required from the original study required to carry out the meta-analysis reported here.

² Participants were not required to provide demographic information. In Study 1 Sample A, one participant did not provide their age. In Study 2, one participant did not indicate their ethnicity.

³ As per Chou (2015a), comfort with technology was included as a covariate in all analyses. Whereas Chou (2015a) reported nonsignificant covariate effects of comfort with technology in ANOVAs of both outcomes, that covariate was significant in the present Study 1 Sample B and Study 2 for perceived likelihood of contract breach, as reported in the main text. For the indirect effects analyses, in both Samples A and B of Study 1, the effects of comfort with technology on both social presence (Sample A: estimate = -0.08 , $p = .62$; Sample B: estimate = 0.27 , $p = .08$) and on perceived likelihood of contract breach (Sample A: estimate = 0.03 , $p = .85$; Sample B: estimate = -0.21 , $p = .10$) were nonsignificant. While the effect of comfort with technology on social presence was also nonsignificant in Study 2 (estimate = 0.09 , $p = .15$), its effect on perceived likelihood of contract breach was significant and negative (estimate = -0.14 , $p = .01$).

Sample B

Once again, participants rated the avatar signature ($M = 2.38$ and $SD = 0.79$) as lower in social presence than the handwritten signature ($M = 3.21$ and $SD = 0.76$), $F(1, 31) = 6.56$, $p = .02$, $\eta_p^2 = .18$, 95% CI of mean difference $[-1.26, -0.14]$, and controlling for comfort with technology ($p = .08$). Further, as expected, participants perceived signers using an avatar signature ($M = 3.29$ and $SD = 0.71$) to be more likely to breach that contract than signers signing by hand ($M = 2.54$ and $SD = 0.61$), $F(1, 31) = 7.56$, $p = .01$, $\eta_p^2 = .20$, 95% CI of mean difference $[0.16, 1.07]$, and controlling for comfort with technology ($p = .03$). The indirect effect of avatar versus handwritten signature on perceived likelihood of contract breach via social presence was once again significant (estimate = $-.20$, standard error = $.13$, and 95% CI $[-.58, -.03]$).

Discussion

The results of Study 1 replicate those reported by Chou (2015a): Avatar digital signatures conveyed lower social presence and led to higher estimated perceived likelihood of contract breach than handwritten signatures. Indirect effects analyses supported the mediating role of social presence, whereby the impact of signature type on contract breach judgments was mediated by perceptions of social presence.

Although promising, Study 1 was limited in its sampling of undergraduate students in an upper-level social psychology course. Although the course content had not covered concepts directly related to the research question addressed by the study, there is the chance that increased knowledge of the field of social psychology may have impacted the degree to which signature type impacted impressions. Further, although the analyzed Samples A and B achieved .68 and .83 power, respectively, to detect the smaller of the two condition-wise differences (Sample A: $d = 0.72$; Sample B: $d = 1.07$; two-tailed test at $\alpha = .05$), sample sizes were lower than ideal for the purposes of replication (e.g., against Simonsohn's (2015) suggestion of a sample size 2.5 times that of the original). Study 2 was conducted to address these limitations.

Study 2

Study 2 served as a further close replication attempt of Chou (2015a; Study 3b) with a larger, community sample. All methods were identical to Study 1: 265 participants recruited via Mechanical Turk (restricted to U.S. based accounts) viewed either an avatar-signed ($n = 112$) or hand-signed ($n = 116$) lease contract, judged the signer's social presence ($\alpha = .78$) and likelihood of contract breach ($\alpha = .79$), and indicated their comfort with technology. Following preregistered exclusions, data from 228 participants (45.6% female; $M_{\text{age}} = 37.05$ and $SD_{\text{age}} = 11.55$; 76.2% White/Caucasian, 7.4% Asian, and 7.0% African American) were analyzed.

Once again, participants rated the avatar signature ($M = 3.36$ and $SD = 0.94$) as lower in social presence than the handwritten signature ($M = 3.97$ and $SD = 0.74$), $F(1, 225) = 26.59$, $p < .001$, $\eta_p^2 = .11$, 95% CI of mean difference $[-0.81, -0.36]$, and controlling for comfort with technology ($p = .15$). Further, as expected, participants perceived signers using an avatar signature ($M = 2.84$ and $SD = 1.04$) to be more likely to breach that contract than signers

signing by hand ($M = 2.08$ and $SD = 0.66$), $F(1, 225) = 37.18$, $p < .001$, $\eta_p^2 = .14$, 95% CI of mean difference $[0.48, 0.93]$, and controlling for comfort with technology ($p = .004$). The indirect effect of avatar versus handwritten signature on perceived likelihood of contract breach via social presence was once again significant (estimate = $-.30$, standard error = $.08$, and 95% CI $[-.47, -.17]$).

Meta-Analysis

A meta-analysis was conducted to derive effect size estimates for social presence and perceived likelihood of contract breach spanning the three samples reported here as well as Study 3b of Chou (2015a). The aim of this meta-analysis was to estimate more precise parameters for the overall effect of viewing avatar versus handwritten signatures on judgments of social presence and likelihood of contract breach. Meta-analytic approaches enable generalization beyond minor differences in sample demographics between specific experiments included in the meta-analysis (Borenstein et al., 2009; Lipsey & Wilson, 2001).

Meta-analytic calculations were deployed using the processes detailed by Goh et al. (2016). A fixed effects analysis, in which effect sizes were weighted by sample size, was employed.⁴ Cohen's d estimates were first converted into Pearson's correlation values, which were then Fisher's z transformed. Subsequent to analysis, estimates were converted back to Pearson's correlations, and then back to Cohen's d for reporting.

Input effect sizes and the meta-analyzed effect size estimates are presented in Table 1. Overall, the meta-analyzed effect of signature type on social presence ($d_{\text{weighted}} = -1.11$) was highly significant, $Z_{\text{combined}} = 8.95$, $p < .001$, two-tailed, such that avatar signatures were rated as lower in social presence than handwritten signatures. For perceived likelihood of contract breach, the meta-analyzed effect of signature type ($d_{\text{weighted}} = 1.23$) was also highly significant, $Z_{\text{combined}} = 9.68$, $p < .001$, two-tailed, such that avatar-signed contracts were expected to be breached more so than hand-signed contracts.

General Discussion

The results of two preregistered studies comprising three samples replicated a pattern observed in prior research that, relative to handwritten signatures, digital signatures negatively impact social presence, and in so doing, increase viewers' inclination that the document may be breached. Specifically, signers using an avatar were rated as less socially present and perceived to be more likely to breach the contract than those hand-signing a contract. A meta-analytic approach combining the effect sizes observed here and those from Chou (2015a) Study 3b yielded large and statistically significant effect size estimates of the impact of avatar signatures on both social presence and perceived likelihood of contract breach. Further, the indirect effect of avatar signatures versus handwritten

⁴ A fully random effects test of the overall effect of signature type on social presence was also significant, as indicated by a one-sample t -test of the mean ES against zero, $d_{\text{unweighted}} = -1.09$, $t(3) = 6.09$, $p = .009$, two-tailed. Similar results emerged for a fully random effects test on likelihood of contract breach, $d_{\text{unweighted}} = 1.25$, $t(3) = 5.07$, $p = .02$, two-tailed. Due to the small number of studies, heterogeneity tests were not conducted (Goh et al., 2016).

Table 1

Descriptive Statistics and Effect Size d Estimates for Study 3b Reported in Chou (2015a) and Studies 1 and 2 and the Results of a Meta-Analysis Across the Four Samples

	<i>n</i> per condition		Observed power	Social presence			Perceived likelihood of contract breach		
	Avatar	Handwritten		Avatar <i>M</i> (<i>SD</i>)	Handwritten <i>M</i> (<i>SD</i>)	<i>d</i>	Avatar <i>M</i> (<i>SD</i>)	Handwritten <i>M</i> (<i>SD</i>)	<i>d</i>
Chou Study 3b				2.83 (0.76)	4.05 (0.70)	−1.67	4.03 (0.79)	2.52 (0.61)	2.14
Study 1 Sample A	21	28	.68	2.67 (0.94)	3.32 (0.86)	−0.72	3.27 (0.87)	2.50 (0.89)	0.87
Study 1 Sample B	13	21	.83	2.38 (0.79)	3.21 (0.76)	−1.07	3.29 (0.71)	2.54 (0.61)	1.13
Study 2	112	116	>.99	3.36 (0.94)	3.97 (0.74)	−0.72	2.84 (1.04)	2.08 (0.66)	0.87
Meta-analyzed effect size						−1.11			1.23

signatures on perceived likelihood of contract breach via social presence was nonzero in both studies, across all three samples.

Of note, the meta-analyzed effect sizes that emerged in these replication studies were substantially larger than those from an internal meta-analysis reported by Chou (2015a, Footnote 5), which correspond to $d = -0.56$ for social presence and $d = 0.37$ for “negativity”. Given that Chou’s internal meta-analysis compared all digital signatures to the handwritten signature, the larger meta-analyzed effect sizes observed here may stem from comparison of only the avatar signature to the handwritten signature. Additionally, the “negativity” effect size reported by Chou included perceived likelihood of contract breach (Study 3b) as well as appraisal of the validity of a reimbursement claim (Study 2). It may be the case that assessment of legal documents is more sensitive to signature type than the assessment of accounting documents. Direct tests of this possibility remain to be carried out in the future research.

Digital signatures impact not only perceptions of the signer but also the signer’s own psychological experience. Signatures serve as symbolic representations of the self (Jorgenson, 1977; Kettle & Häubl, 2011; Mailhos et al., 2016; Shu et al., 2012). For example, in prosocial contexts, providing a signature relative to an anonymous comment increases the signee’s sense of generosity and commitment to the cause (Koo & Fishbach, 2016). Consistent with the line of work extended in the present studies, digitizing the signature process undermines signers’ own sense of social presence and subsequent honest behavior (Chou, 2015b). Promisingly, recent research highlights how digital pledge processes can be modified to enhance commitment (Chou et al., 2020).

In addition to providing a valuable replication, this research contributes to a growing body of empirical work at the intersection of writing style and social perception. One particular area of focus has been in consumer settings: Handwritten typeface on product packaging (Izadi & Patrick, 2020; Schroll et al., 2018) and on restaurant menus (Liu et al., 2019) enhances favorable consumer experience. Corroborating the present findings, these consumer effects are explained by the human presence that the handwritten font conveys. Together, this body of work impels future research exploring parallel effects on signage design in community-messaging settings (e.g., Verdonk et al., 2017; Wu et al., 2018).

This research also carries practical implications for legal and government sectors. Although e-petitions are a powerful tool for political action (Jungherr & Jürgens, 2010; Wright, 2015), the results from this research cast doubt on perceived signees’ commitment, thus potentially undermining the efficacy of e-petitions as mechanisms for social change. In addition, although digital

signatures are legally permissible in many countries worldwide (see Adobe Systems Incorporated, 2016 for an overview), their increasing use may have as yet unrecognized impact on the inferences made by signing parties. In line with the findings reported here, if signatory parties perceive another party to be likely to breach a contract, they themselves may be more likely to withdraw or even breach the contract. In the accounting domain, with increasing global uptake of online tax filing, including 89% of U.S. taxpayers in 2019 at current estimate (Efile.com, 2020), it will be important to examine the impact of digital signatures on auditors’ evaluation of the legitimacy of claims. In situations where digital signatures are required, one avenue for the future research to explore is the use of dynamically animated signatures. Signing via touchpad or smartphone and animating this signature may increase both signers’ and viewers’ social presence and thus enhance actual adherence by the signer as well as viewers’ trust in the signees’ adherence to the signed document. Such methods, of course, should be tested empirically before widespread adoption and should leverage state-of-the-science theoretical approaches to social presence.

Although this research has strengths in being fully preregistered and adhering to the principles of close replication (Chambers, 2017), several limitations should be acknowledged. First, this research compared only avatar digital signature formats to handwritten signatures. Several other formats of digital signatures exist, some of which impact psychological processes among both viewers (Chou, 2015a) and signers (Chou, 2015b). Moreover, the impact of digital signatures was examined only in the context of a legal contract. It will be important for the future research to consider a wider range of digital signature methods in legal, governmental, and consumer arenas.

Although researching the impact of new technologies such as digital signatures on psychological processes presents a challenge given a constantly shifting landscape, doing so represents an intriguing and practically important endeavor. Continued work in this area is certain to reveal insights into how to best craft a technologically supported world.

References

- Adobe Systems Incorporated. (2016). *Global guide to electronic signature law: Country by country summaries of law and enforceability*.
- Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence, 12*, 456–480. <https://doi.org/10.1162/105474603322761270>

- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. John Wiley & Sons. <https://doi.org/10.1002/9780470743386>
- Chambers, C. (2017). *The seven deadly sins of psychology: A manifesto for reforming the culture of scientific practice*. Princeton University Press.
- Chou, E. Y. (2015a). Paperless and soulless: E-signatures diminish the signer's presence and decrease acceptance. *Social Psychological & Personality Science*, 6, 343–351. <https://doi.org/10.1177/1948550614558841>
- Chou, E. Y. (2015b). What's in a name? The toll e-signatures take on individual honesty. *Journal of Experimental Social Psychology*, 61, 84–95. <https://doi.org/10.1016/j.jesp.2015.07.010>
- Chou, E. Y., Hsu, D. Y., & Hernon, E. (2020). From slacktivism to activism: Improving the commitment power of e-pledges for prosocial causes. *PLOS ONE*, 15(4), Article e0231314. <https://doi.org/10.1371/journal.pone.0231314>
- Crook, S. (2018). Get the full e-signature picture to avoid falling foul of the law. *Computer Fraud & Security*, 2018(8), 12–14. [https://doi.org/10.1016/S1361-3723\(18\)30075-7](https://doi.org/10.1016/S1361-3723(18)30075-7)
- Dunlap, J. C., & Lowenthal, P. R. (2009). Tweeting the night away: Using Twitter to enhance social presence. *Journal of Information Systems Education*, 20(2), 129–135.
- Efile.com. (2020). *Income Tax Return, eFile Statistics*. <https://www.efile.com/efile-tax-return-direct-deposit-statistics/>
- Goh, J. X., Hall, J. A., & Rosenthal, R. (2016). Mini meta-analysis of your own studies: Some arguments on why and a primer on how. *Social and Personality Psychology Compass*, 10, 535–549. <https://doi.org/10.1111/spc3.12267>
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis*. Guilford Press.
- Izadi, A., & Patrick, V. M. (2020). The power of the pen: Handwritten fonts promote haptic engagement. *Psychology and Marketing*, 37, 1082–1100. <https://doi.org/10.1002/mar.21318>
- Jorgenson, D. O. (1977). Signature size and dominance: A brief note. *The Journal of Psychology: Interdisciplinary and Applied*, 97(2), 269–270. <https://doi.org/10.1080/00223980.1977.9923972>
- Jungherr, A., & Jürgens, P. (2010). The political click: Political participation through e-petitions in Germany. *Policy and Internet*, 2(4), 127–161. <https://doi.org/10.2202/1944-2866.1084>
- Kehrwald, B. (2008). Understanding social presence in text-based online learning environments. *Distance Education*, 29(1), 89–106. <https://doi.org/10.1080/01587910802004860>
- Kettle, K. L., & Häubl, G. (2011). The signature effect: Signing influences consumption-related behavior by priming self-identity. *Journal of Consumer Research*, 38, 474–489. <https://doi.org/10.1086/659753>
- Koo, M., & Fishbach, A. (2016). Giving the self: Increasing commitment and generosity through giving something that represents one's essence. *Social Psychological & Personality Science*, 7(4), 339–348. <https://doi.org/10.1177/1948550616628607>
- Laborde, C. M. (2010). *Electronic signatures in international contracts*. Peter Lang. <https://doi.org/10.3726/978-3-653-00124-2>
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Sage Publications.
- Liu, S. Q., Choi, S., & Mattila, A. S. (2019). Love is in the menu: Leveraging healthy restaurant brands with handwritten typeface. *Journal of Business Research*, 98, 289–298. <https://doi.org/10.1016/j.jbusres.2019.02.022>
- Lu, B., Fan, W., & Zhou, M. (2016). Social presence, trust, and social commerce purchase intention: An empirical research. *Computers in Human Behavior*, 56, 225–237. <https://doi.org/10.1016/j.chb.2015.11.057>
- Mailhos, A., Buunk, A. P., & Cabana, Á. (2016). Signature size signals sociable dominance and narcissism. *Journal of Research in Personality*, 65, 43–51. <https://doi.org/10.1016/j.jrp.2016.09.004>
- Mason, S. (2012). *Electronic signatures in law*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511998058>
- Osei-Frimpong, K., & McLean, G. (2018). Examining online social brand engagement: A social presence theory perspective. *Technological Forecasting and Social Change*, 128, 10–21. <https://doi.org/10.1016/j.techfore.2017.10.010>
- Pichler, D., & Tomić, D. (2019). Electronic signature in legal theory and practice—new regulation. In S. Drezgic, S. Zikovic, & M. Tomijanovic (Eds.), *Economics of Digital Transformation* (pp. 57–70). University of Rijeka.
- Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks*, 7(1), 68–88.
- Schroll, R., Schnurr, B., & Grewal, D. (2018). Humanizing products with handwritten typefaces. *Journal of Consumer Research*, 45(3), 648–672.
- Shu, L. L., Mazar, N., Gino, F., Ariely, D., & Bazerman, M. H. (2012). Signing at the beginning makes ethics salient and decreases dishonest self-reports in comparison to signing at the end. *Proceedings of the National Academy of Sciences of the United States of America*, 109, 15197–15200. <https://doi.org/10.1073/pnas.1209746109>
- Simonsohn, U. (2015). Small telescopes: Detectability and the evaluation of replication results. *Psychological Science*, 26, 559–569. <https://doi.org/10.1177/0956797614567341>
- Srivastava, A. (2011). Resistance to change: Six reasons why businesses don't use e-signatures. *Electronic Commerce Research*, 11, 357–382. <https://doi.org/10.1007/s10660-011-9082-4>
- Swan, K., & Shih, L. F. (2005). On the nature and development of social presence in online course discussions. *Journal of Asynchronous Learning Networks*, 9(3), 115–136.
- Tzelios, K., & Williams, L. A. (2020). *The psychological impact of digital signatures: A multistudy replication*. <https://osf.io/85ctb/>
- Verdonk, S., Chiveralls, K., & Dawson, D. (2017). Getting wasted at WOMADelaide: The effect of signage on waste disposal. *Sustainability*, 9(3), Article 344. <https://doi.org/10.3390/su9030344>
- Wright, S. (2015). E-petitions. In S. Coleman & D. Freelon (Eds.), *Handbook of digital politics* (pp. 136–150). Edward Elgar Publishing. <https://doi.org/10.4337/9781782548768.00017>
- Wu, D. W. L., Lenkic, P. J., DiGiacomo, A., Cech, P., Zhao, J., & Kingstone, A. (2018). How does the design of waste disposal signage influence waste disposal behavior? *Journal of Environmental Psychology*, 58, 77–85. <https://doi.org/10.1016/j.jenvp.2018.07.009>

Received June 07, 2020

Revision received July 08, 2020

Accepted July 26, 2020 ■