

How Impactful Is Presentation in Email? The Effect of Avatars and Signatures

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A primary well-controlled study of 900 participants found that personal presentation choices in professional emails (non-content changes like Profile Avatar & Signature) impact the recipient's perception of the sender's personality and the quality of the email itself. By understanding the role these choices play, employees can gain better control over how they influence the recipient of their messages. Results further indicate that although some variations can positively impact the recipient's view of the sender, these same variations often also have negative side effects. This implies that many seemingly innocuous presentation decisions should be made in the context of who is receiving the email, and if these effects negatively impact the content of the message. For example, although statements in a Signature about the email having been written on a phone are included to preemptively apologize for typing mistakes, this causes the sender to appear less agreeable, less conscientious, and less open, and the email itself appears less well written and more poorly formatted. This is surprising given that the email itself was not changed in the study.

CCS Concepts: • **Human-centered computing** → **Empirical studies in HCI**; **Computer supported co-operative work**; *Empirical studies in collaborative and social computing*;

Additional Key Words and Phrases: Email, formatting, layout, personality, halo effect, Big Five Index, avatar, signature

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1 INTRODUCTION

In many environments, but especially within a work context, employees are expected to use email with a tacitly agreed-upon degree of professionalism and work appropriateness. Although the specifics of these requirements have been informally codified as following good grammar, and

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avoiding inappropriate topics (e.g., politics or sex), aspects of presentation (visual elements separate from the message content) in emails have not been formally addressed or studied.

The primary contribution of this work is a study of how author-controlled presentation choices in email impact the reader's perception of the sender. Although there are many stylistic dimensions that email authors have at their disposal (semantic content/grammar [40], typographic changes, etc.), this article focuses on the two unique dimensions that authors can manipulate to present and identify themselves: *Signature* (the text after the sender signs off), and *Profile Avatar* (which appears next to the sender's name in the client).

This work directly draws a parallel from a non-email context; initial and non-performance impressions have been shown to directly color all subsequent performance behavior in what was termed the *Halo Effect* [102]. In other words, if Colleague A initially thinks well of Colleague B, then good work B does look fantastic to A, and bad work is easily overlooked, with the converse being true as well: if Colleague A initially thinks poorly of Colleague B, then bad work B does look horrible to A, and good work is easily overlooked as pure luck or an anomaly. These impressions can take a long time to overcome, biasing future actions for an extended period of time [71, 86]. Further, in researching the Halo Effect, these biasing impressions are driven by non-performance, non-content features such as physical appearance [26, 107]. This parallels Signature or Profile Avatar, initial non-content features of a sender. In a more theoretical way, this work seeks to determine if there may be a theoretical parallel between the Halo Effect and email presentation choices.

To measure readers' subconscious reactions to these presentation variations, 900 unique Mechanical Turkers (hereafter, Turkers) were asked to complete a personality test about the *sender* of an email (while controlling the email's content) in the context of a professional or work environment. In particular, the **Big Five Inventory (BFI)** was used, a mainstream conceptualization of personality [56] measuring five personality dimensions: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness (plus four additional questions relating to style to examine how recipients view the quality of the email). One unique reason for choosing the BFI was its documented use by other researchers to measure *perceived* personality [20, 38], making it ideal for this experiment.

Results show that these self-presentation design dimensions impact the perception of both the sender's personality and the mail's quality. Further, although variations can positively impact the recipient's view of the sender, these variations often have negative impact. This implies that many of these seemingly innocuous presentation changes should be made that consider the context of the receiver.

To briefly summarize the findings, Signatures should be as simple as possible (if present at all), and including social media contact information can have some positive impact on the recipient's perception. Profile Avatars allow users to have some flexibility in presenting themselves as being serious, or slightly light-hearted, but having no Profile Avatar is ideal. However, if the absence of a Profile Avatar results in a placeholder image (as in many email clients), this will generally have a negative impact, and therefore users should choose a Profile Avatar over having a default placeholder image. Of particular note is that decisions such as including Signatures about emails being written on a phone, or having Profile Avatars of babies, have very strong negative impacts.

2 RELATED WORK

This section highlights noteworthy trends in email research and relevant prior work beyond email (although it should be noted that presentation may impact other media differently to that of email).

2.1 General Research on Email

Email is possibly the most successful communication medium of recent times. The excessive use of this medium has led to many issues. The majority of *enterprise* email research has focused on email overload—the stress caused by users not being able to handle the number of emails they receive. Users must deal with a large quantity of messages while mentally triaging an email’s status and type [41] using factors such as content, personal utility, and task importance [108]. Further, message content can increase overload when a sender requests information, forces a deadline, or requests an immediate reply [101].

Although there are many techniques to facilitate manual organization,¹ studies have shown that these techniques reduce, rather than enhance, productivity [83] and the retrieval of previously viewed or searched for emails [109]. Worse yet, these manual processes (which provide little value) increase users’ workload [110].

To reduce the burden of manually managing and triaging emails, several systems have been proposed to automatically sort emails by value [1, 21, 34]; sender or message content history [1, 34]; or by identifying tasks [22] such as sending an attachment [3, 82], replying [30, 82, 90], and forwarding [82]. In addition, task prediction has been explored with groups of emails [10] and with enterprise managers [5]. Some creative solutions have been explored, including changing how email messages are displayed using a two-dimensional chart format of time by subject [44] or time by user [112].

Email research extends beyond management. There have been efforts ranging from understanding implicit social networks and social communities [19, 60, 67, 78, 106, 113] to predicting salient emails in universities [23] to studying semantics of communication [40] to perception changes due to email content’s spelling and grammar [55] or email/user-name [6, 104] or to alerting users when they have missed a message [82]. Researchers have also examined the role of attachments in email construction [99], alerting users if they fail to include an attachment [4, 29], summarizing attachments for triage [45], and visualizing email databases [46].

The evolving usage of emoticons in **Computer-Mediated Communication (CMC)** has been broadly studied [24, 25, 31, 59, 98], with extensive research on the use of emoticons in instant messaging platforms [31, 39, 53, 57, 64, 80, 105, 111]. Little research has been found on the usage of emoticons within a business setting. This might be due to emotions in a business setting being considered unprofessional [31], and emoticon usage is heavily influenced by social context [25, 31, 39, 96] (e.g., age [59]). Given that the primary focus of this article is a work/professional context, and the literature surveyed did not indicate emoticon usage in this particular social context, emoticons were considered outside the scope of this work.

2.2 Avatars and Profile Pictures

The use of Profile Avatar or Profile Pictures in email messages have not been widely studied. A 2005 article [62] surveyed South Korean’s use of “Avatar Email,” a novel avatar-centric emailing platform (providing anime-styled pictures, where emails and profiles could be configured with emotions and expressions, etc., for each email). Their survey results indicated that users were more likely to use Avatar Email for email to superiors, then traditional email (with no difference in lateral or downward communication). The authors postulate that this change for upward communication is due to a closer emulation of “face-to-face or telephone interaction.” However, the respondents cited pleasure or amusement as the main motivation for using the Avatar Email over traditional email.

¹ Annotation [85]; reminders [63]; manual triage [54, 79]; generating tasks [9]; or even labels, flags, or folders [109].

Although this work has some unique findings, this is not a commonly deployed system, and the work focused exclusively on the *sender's* motivation and did not examine recipients' perception of the sender, nor the avatar's impact on the email's quality.

2.2.1 Beyond Email Avatars. In a professional context of workplace videoconferencing, Inkpen and Sedlins [52] explored users' reaction to different styles of avatars for representing oneself. Their work asked participants to rate potential pictures on the dimensions of casual vs. formal, creepy/eerie vs. pleasant/unscary, realistic vs. cartoonish, and comfort interacting/using the avatar. This work generally showed that participants were "open to the idea of using avatars..., however, the choice of avatar can significantly impact people's comfort." Further, although cartoon/realism or casual/formal were not important dimensions, images that were "creepy" were the key detracting factor.

Beyond this, there is more directly relevant research pertaining to avatars in an email or a work context. Tangential research has shown the benefits of avatars for stranger perceptions and identities in online communities [27, 38], the importance of avatar customization in online communities [16, 17], avatars impact on recruiting [7], or increasing co-presence during audio-only conferencing [11, 94].

In a more general study about avatar perception, avatars were created in a cartoon-styled creation tool, although the use/context was not specified (e.g., email, computer game, online community) [38]. The creators of the avatars were then given the BFI measure [70] to examine their own avatars. Later, the same avatars were shown to an additional set of participants and another BFI measure was taken. These two perceptions were compared, and results showed that elements of extraversion, agreeableness, neuroticism, and openness were detectable based on clothing, hair, jewelry, eye type, and expression. In short, avatars in isolation do convey a great deal of information about the creator to others.

The two most relevant works by Fong and Mar [38] and Inkpen and Sedlins [52] do not examine the impact of avatars on recipients' perception of sender in email; whereas Fong and Mar [38] detected impact of avatars in isolation and Inkpen and Sedlins [52] suggest that people care about their avatar choice, the existing work does not answer if avatars have an impact in the context of email. Moreover, both works only looked at cartoons in contrast to real-life images of the sender. Their work gives guidance to this article, which is a natural outgrowth of that prior research.

2.3 Signatures

The specific communicative function of email signatures is not established in the literature, although work in the social science and psychology literature has attempted to uncover some roles it may play. Some research suggests that it is to make the sender "a more effective online communicator" by conveying identity [8], to "reveal what the sender is about" [35], or perhaps as a method to display professionalism [32]. Abernathy [2] suggests, in a professional context, that signatures act to promote the company's identity rather than that of individuals. The study of Rains and Young [81] using genre theory appears to suggest that signatures are used for impression management, to show where people exist in a company (to command authority), to underscore that individual's importance, or to add structure to the end of an email. Likewise in a non-email context (online communities), Donath [27] shows that signatures are used to "verify the legitimacy of the writer" (p. 10).

Harmon-Jones et al. [47] performed an examination on the relationship between the rankings of universities and the symbolic self-completion (people explicitly listing symbols, e.g., titles, degrees) in email signatures. Faculty with more publications or coming from better schools used fewer attainment symbols in their signature. This is suggesting that titles and bragging are deeply related

to the confidence or insecurity of the individual. These results appear to follow those of Rains and Young [81].

Some work has also highlighted the tension between privacy and signatures [43, 81]. “[S]ignatures are opaque. Signatures offer a general introduction for the sender while concealing that information that makes the sender unique” [81, p. 1056]. Thus, elements that are oversharing, revealing an inappropriate amount of detail about one’s personal life, are largely concealed. The most common elements found by Rains and Young [81] were personal name, work phone, organization name, title, and fax number.

Although this existing work has looked at existing practice, usage, and motivation of signatures, none of this work has looked at the *impact* of perception of the email recipient, making this study an extension of prior work.

2.4 Personality Testing

The primary dependent measure in this work is the recipient’s perception of the sender’s personality. Personality tests² have been used for decades [20, 42, 73, 77, 97] to explore and categorize people based on their inclinations, interests, or tendencies. The Myers-Briggs test, a set of 93 questions that ranks respondents into one of 16 personality types, has been commonly employed in HCI literature (e.g., [61, 74, 75]). However, although it is thought of as a general-purpose “personality test,” in the originating field of psychology it is often used for employment/vocational purposes [14, 15, 18, 50, 68, 97].

The BFI measure [56, 70] has been heavily validated by the psychological community [56, 95]. Further, the ubiquity of this approach has been shown to be “human universal,” or consistent across multiple cultures and world locations [69]. In contrast to Myers-Briggs, the BFI has been studied as both a self and observer test (asking about other people) [20]. Fong and Mar [38] explicitly used the BFI to compare creator and non-creator reactions to user-created avatars, and Back et al. [6] used the BFI to study the impact of email addresses. Therefore, the BFI is the appropriate measure for this work, which analyzes how individuals are perceived by others.

However, examining personality has gone beyond explicit testing. Markers in online behavior [92] and email content [93] have been used to infer personality and align them with these personality measures.

3 SCOPE AND LIMITATIONS

This article focuses on the impact of a sender’s self presentation decisions in an email recipient’s perception of the email sender. This work was scoped by upfront informal interviews and then experimentally measured using the BFI [56]. This work targets the enterprise/professional context. Thus, participants in both the interviews and experiment were explicitly instructed to evaluate the email and sender in a professional or work context. The impact of presentation on joking, sentimental, or other personal emails, and emails for marketing/advertisement, was excluded. As in prior work [48, 49], this work does not perform an exhaustive study of every possible email presentation variation.

Presentation impacts are discussed as being positive or negative, referring to a positive or negative *social impact*. For example, appearing quantitatively more neurotic would be considered negative, as it is not socially desirable to appear neurotic. Likewise, appearing more open would be considered positive.

²Work outside of the personality test domain that is closely related but not quite applicable is the stereotype content model. The stereotype content model is a social cognition model created by Fiske et al. [36, 37] that maps social groups onto two dimensions (warmth and competence) with a series of 16 questions.

4 INFORMAL INTERVIEWS

Before conducting an in-depth quantitative study of the subconscious impact of Profile Avatars and Signatures, a series of semi-structured informal interviews was conducted focusing on the conscious reaction to Profile Avatar and Signatures. Fifteen individuals participated (8 female), from 11 companies (startups and large corporations), with a mean age of 34 years (SD 9.6). All participants (denoted by P#) were required to be presently employed by a corporation (no students) and use email regularly at work. No remuneration was given to these volunteers. These interviews were used to identify experimental conditions for the study.

Unlike the majority of prior work that looked at why people choose an Profile Avatar or Signature, these interviews focused on what people consciously thought when receiving them. Discussions lasted for roughly 45 minutes and consisted of three main phases. Phase 1 focused on what types of Profile Avatar or Signature participants thought were useful and what they thought were “annoying.” Phase 2 focused on asking about what type of Profile Avatar or Signature different personality types would use (e.g., extraverted vs. introverted). Phase 3 of the discussion was a free-form brainstorm about what types of Profile Avatars or Signatures they have seen in their work, and what they thought about those examples.

When presenting statements from these interviews, we selected representative quotes that were illustrative of views shared by multiple participants.

4.0.1 Signatures. All of our participants viewed Signatures as an important element when receiving emails: “[It’s] the most important information. It’s pretty good when it has who you are, where you at and how people can reach you.” Consistent with much of the related work, contact information was considered highly valuable by all participants:

Company stuff, at least all contact details, in a business email, if there is not phone number in the email ... or actually, the most important thing is the phone number. If it isn’t in the email and you want to call him and have to look it up first that is super annoying. (P2)

Although users varied in what information should be present in Signatures, brevity in signatures was also highly prized. For example:

It’s stupid when people include email addresses in their signatures, because you just sent an email using that address ... it’s redundant. For efficiency sake, you wouldn’t want a whole paragraph for the signature, keep it simple but informative ... It seems unprofessional. (P6)

Participants saw Signatures as a method to represent yourself: “It’s more like how a person wants to be seen. Like they expect to be their image to be like that, I guess” (P8).

Building on the need for brevity, a few participants saw images/logos in signatures to be distracting:

I don’t want to look at the logo every time again. It’s also a pain in the ass to load an image into an email or signature. So why? Why would you do that. Screenshots or images or graphics that’s what you should use pictures for. But not in signatures. I don’t like any signatures with pictures. Especially if you are on a mobile device it takes forever to scroll through and then it’s indented. That bugs me. (P8)

Further, although contact and professional information was seen as critical to a good signature, participants thought that bringing personal causes or personal information into Signatures ranged from annoying to extremely inappropriate:

I don't like life messages ... That is so annoying when I get that. Beautiful thoughts. I think I hate that more than icons. I think the sender is religious, just quoting stuff from the bible and trying to convert me. Not neurotic, just annoying. It's like "please donate 50 cents to child care." You don't know me, you don't know me, I do a lot of stuff. It's preachy. (P6)

This feedback indicated a need to explore a wide variety of Signature types, from contact and company information to Signatures with more personal messages. However, it is interesting to note that not all users had them, even while extolling their virtues: “No, but I am impressed with people who do, I think that’s important” (P1).

4.0.2 Profile Avatars. Although Signatures were viewed as part of the corporate landscape, Profile Avatars garnered longer discussions. All participants agreed that “Profile avatars are useful. It’s always good to put a face to a name” (P3), or “Profile avatars are really useful because sometimes when I am looking for a person and I see the person I am feeling more confident that I send it to the right person then it’s fine” (P6). And although keeping the picture “professional” was important, not all participants defined a professional picture the same way. For example, whereas P3 suggested a more utilitarian solution (“nothing in the background, no one else in the picture, just me against a backdrop”), P2 suggested that it is more about focus than context and removing extraneous information (“When it’s cropped out of a free-time activity photo ... I did that myself but I made sure that it’s not too funny or casual”). However, pictures that were too casual were frowned upon: “My picture is not really professional and I am probably leaving a bad impression. It’s me eating a bowl of noodles” (P5), and “A professional avatar would not be a picture doing a free time activity, like hiking or something.” The key point that was often brought up was that the Profile Avatar be a photograph of the sender, although the context or seriousness of the photos appeared to be up for debate. This difference (casual vs. formal) we call out in our quantitative evaluation.

When discussing abstract representations of the sender (e.g., a “non-creepy” cartoon inline with the work of Inkpen and Sedlins [52]), participants felt that was non-professional: “[This] doesn’t show me who you are. What are you hiding?” (P1). This is an interesting contrast to the findings of Inkpen and Sedlins [52]. P8 provided insight into this negative reaction, stating that with a cartoonish Profile Avatar, “people don’t take you seriously unless you have super hyper skills,” implying that the sender is too full of themselves, believing their skills justify an inappropriate level of casualness. Another interpretation is that abstract representations of the sender indicates a lack of professionalism.

People also volunteered some common “annoying” Profile Avatars that they have encountered. One was personal/family pictures. P4 described this frustration best by stating, “Also when the profile picture has kids. That shows me he’s really proud of his family but not appropriate in an email. It’s not facebook.”

One other type of Profile Avatar that was universally destained was that of the missing Profile Avatar. Our respondents all found it extremely bad to not have a Profile Avatar stating:

No profile picture, maybe they just don’t put it any effort, it’s not really good. Especially if everyone else has one and there is a reason like its supposed to mean everyone is more connected and that person is just not contributing. Especially if they have been working there for a long time. (P1)

The whole point of having a profile avatar is to connect the person with a face ... it makes me think he doesn’t understand what the profile avatar is there for. (P2)

That's also bad because everyone has one and this guy doesn't, there is always that guy that has to have it differently. (P4)

My introverted colleagues don't even have profile pictures. They just don't care. (P6)

This highlights the need to experimentally test the impact of having the “missing” Profile Avatar picture.

5 QUANTITATIVE EXPERIMENT METHODS

The focus of this article is squarely on the *visual methods* used to present and identify the author of an email, similar in spirit to prior research that examines how to visually present progress bars [48, 49], visual impact of web-based interruptions [100], or personality-targeted user interface [76]. Like these prior studies, the user's primary task is fixed, and aspects of visual presentation are manipulated to test their effects, while controlling the remaining variables (e.g., email message content).

To explore the relationship between email authors' self-presentation (independent measure) and the perception that the email elicits from the recipient (dependent measure), a between-subject design study using 900 Turkers was conducted.

5.1 Experimental Questions

The following experimental questions were investigated:

- Q1: Do *Profile Avatars* impact the email recipient's perception of *the sender*?
- Q2: Do *Profile Avatars* impact the email recipient's perception of the *email's quality*?
- Q3: Do *Signatures* impact the email recipient's perception of *the sender*?
- Q4: Do *Signatures* impact the email recipient's perception of the *email's quality*?

5.2 Participants: Mechanical Turk, Payment, and Screening

Mechanical Turk (MT) is a service provided by Amazon.com in which participants (Turkers) are assigned **Human Intelligence Tasks (HITs)**—small assignments that they can complete. Upon the completion of each HIT, the requester verifies the completion, and (if approved) the Turker is paid. The MT service was used to collect quantitative data on recipient perception of the email's sender.

MT and other general population crowdsourcing tools have been shown to be useful beyond the academic field, as it has been documented to be an effective tool in an industrial setting at companies such as Facebook, Dropbox, Google, Groupon, LinkedIn, and Microsoft [65]. Similar experiences are expressed in the following quote:

We're impressed with the speed and the accuracy of its results. For example, a project we estimated would take a full-time staffer almost three days to finish was completed on mTurk overnight for \$37, with 99 percent accuracy. [72]

Using members of the general population for enterprise tasks gives companies access to expertise they do not have, the flexibility to scale work up and down, lower costs, and the ability to perform tasks that internal employees are not willing to perform (and also not in the required time frame) [65]. In an academic setting, Bernstein et al. [12] showed that members of the general population can edit and improve/edit text, even though the workers were not trained editors. In short, crowdsourcing with the general population is well established as a tool for assessing documents and doing tasks even if they are commonly considered as an “enterprise” activity.

Much research has been conducted to date on setting ideal payment amounts for a given HIT [51, 66, 91]. The HIT for completing the BFI and related questions was estimated, during initial

testing, to take 8 to 12 minutes to complete. Turkers were paid 60 cents per HIT. It is important to note that Turkers were randomly assigned to conditions, and therefore bias was also randomly distributed. Each Turker was only permitted to respond to one email, from the data pool.

Given known challenges with variable Turker quality, random clicking, and skipping questions [28], responses were screened in four ways. The first screening technique was done through MT itself: limiting MT responses to those Turkers with at least a 95% approval rate (high general approval) and at least 500 approved HITs (a track record of a substantial number). Second, to reduce random/quick clicking of answers, all Likert and multi-choice questions were pull downs (instead of radio buttons). Third, HIT completeness was checked in real time, not allowing submission unless all questions were answered. Last, a series of sanity check questions were mixed into the survey questions including a open response to “*Summarize the Email Content*”³ and simple math problems (with the math equations written out in English sentences, and responses requiring the same pull-down interaction as any other Likert question).

5.3 Experimental Design

When a Turker accepted a HIT, he or she was presented with a set of instructions. The instructions explicitly stated that Turkers should use their subjective opinions about the sender and take everything into account (email content, format, signature, pictures, etc). Further, the instructions made it clear that the context of the email and evaluation should be made within a work/professional environment (in contrast to a casual, personal, or marketing context).

After reading the instructions, Turkers were presented with one randomly selected “email” from one experimental condition. Rather than rendering the email in HTML, subject to the browser and the Turker’s computer, a PNG image⁴ was used (Figure 1). Turkers could optionally open the image in a new window with a link. Beneath the email image, Turkers were presented with two groups of questions via a web form.

The first grouping of questions consisted of two short-answer sanity check & framing questions: a request for a one- or two-sentence description of the email content, and a request for two or three words that describe the sender. Neither of these short answer questions were used in evaluating Turkers’ reaction to email presentation or used in our analysis. The first question was a sanity check that the respondent read the email, and the second was used to help the Turker shape and consider who the sender was, which set the mental framing for the remaining questions. The second group of questions consisted of 48 quick 5-point Likert questions, whose values were selected with a drop down. The 48 questions are detailed in the following two sections.

5.4 Dependent Measures: BFI (44 Questions)

The goal of this work was to measure the recipient’s perception of the sender. Turkers (playing the role of email recipient) were asked to complete the BFI personality test about the *sender* of the email. The BFI is both a well-grounded personality test [56] and ideal for this work as it can be used to analyze how individuals are perceived by others [20, 38]. Throughout the rest of this article, when referring to these measures, the implication is a perception of the measure (e.g., “increased Openness” means an “increase in perceived Openness”).

The BFI uses 44 questions to describe a person along five indexes with values ranging from 1 (low) to 5 (high). For context, descriptions of John et al. [56, Table 4.4] were used to describe the five indices used in the BFI:

³Which was validated by researchers.

⁴The email PNG was 1024 px wide. According to W3Schools.com, 99% of monitors are *at least* 1024 px wide, with the most common width being 1366 px according to Geek.com.

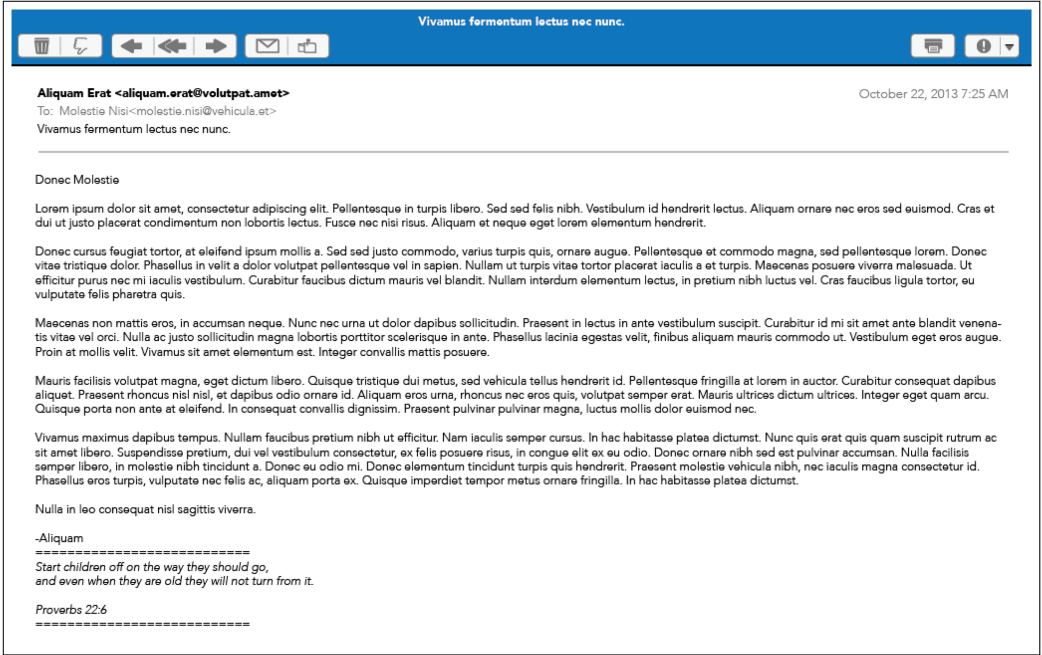


Fig. 1. Example email with Lorem Ipsum text (see Appendix Figures A1 and A2 for all conditions).

- **Extraversion:** High scorers are Talkative and Assertive; low scores indicate being Quiet and Reserved.
- **Agreeableness:** High scorers are Sympathetic and Appreciative; low scores indicate being Cold and Quarrelsome.
- **Conscientiousness:** High scorers are Organized and Thorough; low scores indicate being Careless and Disorderly.
- **Neuroticism:** High scorers are Tense and Anxious; low scores indicate being Stable and Calm.
- **Openness:** High scorers have Wide Interests and are Imaginative; low scores indicate being Commonplace, Simple, and Shallow.

Five unique and non-overlapping subsets of the 44 BDI questions are combined to calculate a score for each dimension. These indexes are generated with a linear combination of the questions, producing a scalar value.

The BFI questions themselves are structured with an initial prompt before the questions, “I am someone who ...,” followed by the completion of the prompt for each question (e.g., “... is talkative”) with a 5-point Likert scale response. The only modification to the original BFI was to refocus questions to the sender [20, 38] by changing the initial prompt to “The *author* of this email is someone who ...”

5.5 Dependent Measures: Email Qualities (4 Questions)

In addition to the five BFI dimensions, the Turkers’ reactions to the email itself were measured. Four additional questions using the same 5-point Likert scale from the BFI were created. Turkers were asked to respond to the statements, “*This email was hard to read,*” “*This email was well formatted,*” “*This email was professional,*” and “*This email was well written.*” A value of 1 was considered

to be strongly disagree, with 5 representing strongly agree. Throughout the rest of this article, when referring to these measures, the implication is a perception of the measure (e.g., “increased Professionalism” means an “increase in perceived Professionalism”).

5.6 Independent Measures: Presentation Variations

The independent variable explored in this experiment are the self presentation choices of emails. Two conceptual dimensions **Signature** and **Profile Avatar** were studied, each of which contains a series of variations. This experiment modifies only one aspect of a control presentation, to control confounds. Images of each variation are presented in Appendix Figures A1 and A2.

Ctrl Control: The control variation used Avenir 12pt #231f20 as its typeface with a pure white background. The body copy extends the entire width of the email (aligned left, rag right, no hyphenation). The sender had no picture/image/placeholder next to his or her name in the header, and the control signature was a single dash followed by the sender’s first name.

D1 Signature (sig): Signatures are considered to be text that occurs *after* the sender’s name at the end of the email. Variations in the signature of emails were based on a list of annoying signatures [103], common signature elements discussed in the related literature [2, 32, 47, 81], and our initial informal interviews:

- **Religious Quote (Rlg):** *Religious quote from Proverbs 22:6. This could be considered “over-sharing,” which is often concealed [81].*
- **Traditional (Trd):** *Signature stating the sender’s position/title, and the division of the company in which the person works. A professional styled signature [32, 81].*
- **Company Logo (Lgo):** *A large company logo as a signature. This is promoting the company [2].*
- **Logo + Slogan (Sgn):** *A large company logo (as in Lgo) but also including the company’s “pithy” slogan. This is promoting the company [2].*
- **Social Media (Scm):** *All of the sender’s social media information including email, website, Twitter, Facebook, LinkedIn, and Skype. This could be considered a modern version of the work phone and fax numbers [81].*
- **Save the Trees (Tre):** *A pretentious statement about not printing the email: “Do we inherit the Earth from our ancestors or borrow it from our children? Please consider the environment before printing this email.” Annoying signature list [103].*
- **Written on a Phone (Phn):** *A joking signature (with intentional typos) about sending the email from a smartphone “Sent from my iPhone Plese Fogeuve eny typesos.” Annoying signature list [103].*

D2 Profile Avatar (avt): Addition of a profile/sender picture next to the email details. This often occurs within LDAP- or Active Directory-based enterprise environments:

- **Unknown Picture (Ukn):** *Vector-based silhouette of a person—a variation of which is often used by email clients when a picture is unavailable. This is standard in most mail clients. In our upfront investigation, this was universally viewed as being a bad Profile Avatar choice.*
- **Human (Hmn):** *A neutral photo of the sender. A formal “non-creepy” photo [52].*
- **Cartoon Picture (Car):** *A cartoon representation of the sender. A “non-creepy” cartoonish picture [52] consistent with cartoon avatars examined in prior art [38, 62], although generally looked down upon in our upfront interviews, contrary to [52].*
- **Whimsical (Whm):** *Photo of the sender being silly. A casual “non-creepy” photo [52]. Participants in our upfront interviews were split as to the appropriateness of non-formal photos.*

Table 1. Enron Email Categories to BFI Mapping

Email Metric	E	A	C	N	O
4.1 jubilation	○				
4.2 hope / anticipation					●
4.3 humor					●
4.4 camaraderie		●			
4.5 admiration	○				
4.6 gratitude		●			
4.7 friendship / affection		●			
4.8 sympathy / support		●			
4.9 sarcasm					○
4.10 secrecy / confidentiality				○	
4.11 worry / anxiety				●	
4.12 concern				●	
4.13 competitiveness / aggressiveness	○				
4.14 triumph / gloating	○				
4.15 pride					○
4.16 anger / agitation		●			
4.17 sadness / despair				●	
4.18 shame		○			
4.19 dislike / scorn		○			

●, match; ○, synonym; E, Extraversion; A, Agreeableness; C, Conscientiousness; N, Neuroticism; O, Openness.

- **Baby (Bby):** *Photo of a baby (implied to be the sender's).*
- **Cat (Cat):** *Photo of a cat. In reference to popular CAT memes.*
- **Snoopy (comic) (Cmc):** *A non-offensive comic character.*

The preceding list resulted in 14 variations (plus a control), organized into two distinct dimensions (plus a control dimension of one control variation).

5.7 Experimental Controls: Email Body Copy (Content)

Given that any one body copy could elicit a stronger response, thereby introducing unknown biases into study results, a well-studied set of multiple emails were used as the message content. Further, every experimental condition was tested with the same set of email content, and thus body copy content has no experimental impact on our outcome.

To this end, all of our email content was drawn from the UC Berkeley labeled subset⁵ Enron email corpus [58]. Each of the emails in the Berkeley corpus are labeled across multiple dimensions, including Emotional Tone (Category 4.x).

To ensure that the email content used had as equal a distribution across BFI indices as possible, the 4.x term categories were mapped onto BFI indices (Table 1) based on 4.x terms that were explicitly listed and matched (exact or synonymous) in the BFI categories [56, 69, 70, 95]. Mappings were found for all BFI indices except Conscientiousness. Thus, each email had a signal count for each BFI. The email with the highest signal count for a given BFI was selected to be included in the experiment (if multiple emails were tied, the email with the least overlap with other BFI index was selected). In addition, a neutral category was created for emails that had no labeled emotional tone. The selected emails and their statistics are shown in Table 2.

⁵http://bailando.sims.berkeley.edu/enron_email.html.

Table 2. Selected Email Body Copy for Each BFI

Big Five Index	Selected Email ID	Word Count	Signal Count				
			E	A	C	N	O
Extraversion	9205	198	2	0	0	1	2
Agreeableness	175451	1,069	0	3	0	0	0
Conscientiousness	NA	NA	—	—	—	—	—
Neuroticism	7932	1,156	0	2	0	2	0
Openness	174220	1,369	2	0	0	1	2
Neutral	106588	347	0	0	0	0	0

The email with the highest signal count for each BFI based on 4x Signal Count.

E = Extraversion, A = Agreeableness, C = Conscientiousness, N = Neuroticism,

O = Openness.

In addition to the four Enron emails with BFI mappings and the one tone-neutral email, an email was created using Lorem Ipsum (with comparable length to the other emails). This sixth content variation forced participants to explicitly focus on presentation and removed any language-specific bias. Resulting in six content variations (four BFI mappings, one tone neutral, and one Lorem Ipsum), with each presentation variation (independent variable) having a uniform distribution of different email content types.

5.7.1 Copy Origin Bias. To further reduce bias from the body copy of the emails, any companies referenced in the emails (e.g., Enron) were changed to fictitious ones (e.g., Plus Bank) and all names of email senders were changed to male (reducing any gender bias), and westernized (reducing cultural bias). All emails used the same names to ensure consistency. In the experiment instructions, Turkers were explicitly told that names and companies were changed to protect identities.

5.8 Statistical Methods

To examine the statistical differences between control and variations, each of the nine dependent measures (five BFI + four Email Quality) were analyzed along each of the two independent presentation dimensions (Profile Avatar and Signature) separately. Although there may be some inter-relationships between responses (given that they all came from the same respondent), each question contributes to only one dimension, and the psychology community examines each dimension independently using parametric tests, and does not test or account for repeat measures or inter-relationships [20, 38]. This prior work does not consider testing each dimension against a control as “overtesting.”

The analysis consisted of pairs of independent student *t*-tests between the control and each of the variations within independent measure dimension. Because the goal of this study was only to assess differences between each variation and the control (within a single dimension), no comparison was done across groups (e.g., ANOVA). Pairs of independent *t*-tests were used because the community considers that BFI scores are scalar (not categorical), and that each of the five scores are independent; the experimental conditions are independent, and each unique participant only contributes to a single data point; and the data follows a parametric distribution (it is normally distributed). Furthermore, the existing literature on BFI performs *t*-tests for statistical analysis (in keeping with the following methods).

Although performing adjustments for multiple comparisons (e.g., Bonferroni correction, Holm-Bonferroni correction, Šidak correction) are often used to reduce Type I errors, statisticians and researchers [33, 84, 87, 88] have argued that this will increase the chance of making Type II errors, among other things:

Table 3. Summary Statistics: BFI Mean and SD

Class	Group	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
	CTR	3.89 (0.64)	3.53 (0.81)	4.03 (0.78)	2.40 (0.81)	3.35 (0.64)
avt	Bby	3.52 (0.66)	3.06 (0.91)	3.70 (0.69)	2.78 (0.84)	3.01 (0.53)
avt	Cat	3.46 (0.54)	3.19 (0.86)	3.60 (0.80)	2.67 (0.83)	3.04 (0.57)
avt	Hmn	3.48 (0.57)	3.09 (0.90)	4.38 (0.68)	2.69 (0.83)	3.10 (0.55)
avt	Car	3.57 (0.68)	3.13 (0.77)	3.60 (0.81)	2.72 (0.81)	3.67 (0.65)
avt	Ukn	3.45 (0.55)	3.12 (0.84)	4.03 (0.83)	2.71 (0.78)	2.98 (0.56)
avt	Cmc	3.48 (0.59)	3.80 (0.92)	4.32 (0.79)	2.59 (0.88)	3.59 (0.72)
avt	Whm	3.60 (0.61)	3.19 (0.80)	4.39 (0.72)	2.23 (0.75)	3.71 (0.55)
sig	Lgo	3.48 (0.57)	3.26 (0.75)	4.27 (0.72)	2.58 (0.82)	3.61 (0.54)
sig	Trd	3.52 (0.62)	3.25 (0.86)	4.32 (0.66)	2.64 (0.86)	3.05 (0.48)
sig	Phn	3.48 (0.58)	3.14 (0.65)	3.51 (0.91)	2.79 (0.82)	3.03 (0.53)
sig	Rlg	3.44 (0.66)	3.80 (0.86)	4.29 (0.73)	2.61 (0.72)	3.08 (0.62)
sig	Sgn	3.61 (0.67)	3.25 (0.84)	4.24 (0.82)	2.66 (0.89)	3.04 (0.57)
sig	Scm	3.57 (0.61)	3.17 (0.83)	4.34 (0.64)	2.61 (0.68)	3.10 (0.55)
sig	Tre	3.44 (0.53)	3.15 (0.83)	4.26 (0.69)	2.67 (0.79)	2.96 (0.57)

A policy of not making adjustments for multiple comparisons is preferable because it will lead to fewer errors of interpretation when the data under evaluation are not random numbers but actual observations on nature. [87]

In lieu of p -value adjustment, a more transparent method was chosen⁶ by highlighting multiple thresholds of significance following Savitz and Olshan [89], reporting significance at $p < 0.05$, $p < 0.01$, and $p < 0.001$ in our data tables.

5.9 Study Participants

The study was powered to detect an effect size of 0.16 with a statistical power of 0.90. Thus, each variation contained 60 participants (10 for each of the six email content types), the one control, seven Profile Avatar, and seven Signature presentation variations for a total of 900 participants. Each participant only participated *once*, as determined by the MT Turker ID. Each participant only saw one email, a combination of one of the six body-copy types and one of the 15 independent measures (14 variations + control).

6 RESULTS

Summary statistics are presented in Table 3 for the five BFI measures, and in Table 4 for the four email quality measures. t -Test comparisons for each variation vs. control are presented in Table 5. Given the large number of numeric values, composite summary tables are presented with sparklines showing the variations sorted in rank order (based on the mean and standard deviations), highlighting those variations that are statistically different than the control (Tables 6 and 7).

6.1 Profile Avatar: Table 6

Given that the control condition had no Profile Avatar, all variations in the Profile Avatar dimension contained some form of visual representation of the sender. Results indicate that having al-

⁶For complete transparency and readers wishing to adjust for multiple comparisons, the Šidak correction for each dependent measure would be $p < 0.007$.

Table 4. Summary Statistics: Other Questions' Mean and SD

Class	Group	Hard to Read	Well Formatted	Professional	Well Written
	CTR	2.57 (1.41)	3.97 (1.15)	3.95 (1.14)	3.83 (1.24)
avt	Bby	2.78 (1.50)	3.44 (0.99)	3.55 (1.07)	3.42 (1.14)
avt	Cat	2.79 (1.51)	3.33 (1.25)	3.42 (1.19)	3.51 (1.27)
avt	Hmn	2.14 (1.22)	3.49 (1.20)	4.33 (0.97)	3.55 (1.20)
avt	Car	3.20 (1.57)	3.28 (1.22)	3.60 (1.12)	3.31 (1.19)
avt	Ukn	2.81 (1.50)	3.41 (1.19)	4.12 (1.07)	3.41 (1.09)
avt	Cmc	1.97 (1.15)	3.62 (1.06)	4.25 (0.98)	4.00 (1.31)
avt	Whm	2.32 (1.30)	3.52 (1.18)	4.10 (1.21)	4.12 (1.19)
sig	Lgo	2.16 (1.27)	4.10 (1.11)	3.62 (1.16)	3.50 (1.17)
sig	Trd	2.78 (1.47)	3.66 (0.88)	4.27 (1.00)	3.99 (1.27)
sig	Phn	2.76 (1.53)	3.43 (1.20)	3.54 (1.23)	3.35 (1.30)
sig	Rlg	2.21 (1.30)	3.51 (1.11)	3.55 (1.02)	4.20 (1.11)
sig	Sgn	2.30 (1.33)	3.47 (1.18)	4.13 (1.14)	3.53 (1.19)
sig	Scm	2.28 (1.30)	3.69 (0.96)	4.34 (0.94)	4.08 (1.10)
sig	Tre	2.81 (1.51)	3.41 (1.16)	4.12 (0.98)	3.52 (1.15)

most any Profile Avatar makes the sender appear to be less Agreeable, Extroverted, and Open, and the email less Well Formatted. Having a Baby (Bby) or Cat (Cat) negatively impacts how Professional the email looks, further, a Baby, or Cartoon (Car) makes the sender appear to exhibit more Neuroticism. Intentionally not having a Profile Avatar and defaulting to a placeholder image (Ukn) increases perceived Neuroticism. Using a more whimsical (Whm), professional (Hmn), or comic (Cmc) picture makes the sender appear more Conscientious, whereas a Baby (Bby), Cartoon (Car), or Cat (Cat) makes the sender appear less Conscientious. Whimsical (Whm) or Cartoon (Car) Profile Avatars had the benefit of appearing more Open. No Profile Avatar improved how Well Written an email was perceived, but a Cartoon (Car) did lower the email's Well Written score.

6.2 Signature: Table 7

No matter what type of Signature was used, all signatures make the sender appear to be less Extroverted and Open (with the exception of having the company logo, which increases Openness). A Signature informing that the email was written on a cell phone origin (Phn) makes the sender appear to be less Agreeable, Conscientious, Extroverted, and Open; to be more Neurotic; and the email itself appears less Well Written and Well Formatted even though the content of the email was controlled. In contrast, Signatures that contain social media (Scm) or are of a more traditional (Trd) make the sender appear to be more Conscientious, and including social media information increases how Professional the sender seems. Including religious quotes (Rlg) negatively impacts how Professional the email is seen to be. Requesting to save trees (Tre) and including social media (Scm) makes the sender appear to be less Agreeable and the content to be less Well Formatted.

7 DISCUSSION AND IMPLICATIONS

These results clearly show that not only are Profile Avatars and Signatures noticed by the recipient but also they have a measurable impact on the perception of both the sender and the email quality (answering our four experimental questions).⁷

⁷Tables presented in Section 6 are reorganized by dependent measure in Appendix Tables B1 through B9. They are included in the appendix to improve article readability.

Table 5. *t*-Test vs. Control (*p*-values)

Class	Format	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
avt	Bby	0.002 [†]	0.004 [†]	0.018*	0.014*	0.002 [†]
avt	Cat	≤ 0.001 [‡]	0.029*	0.003 [†]	0.084	0.006 [†]
avt	Hmn	≤ 0.001 [‡]	0.006 [†]	0.009 [†]	0.057	0.024*
avt	Car	0.007 [†]	0.005 [†]	0.003 [†]	0.030*	0.005 [†]
avt	Ukn	≤ 0.001 [‡]	0.007 [†]	1.000	0.038*	0.001 [†]
avt	Cmc	≤ 0.001 [‡]	0.086	0.043*	0.234	0.054
avt	Whm	0.012*	0.021*	0.009 [†]	0.220	0.001 [†]
sig	Lgo	≤ 0.001 [‡]	0.061	0.081	0.241	0.016*
sig	Trd	0.002 [†]	0.073	0.030*	0.117	0.004 [†]
sig	Phn	≤ 0.001 [‡]	0.004 [†]	0.001 [†]	0.010*	0.004 [†]
sig	Rlg	≤ 0.001 [‡]	0.073	0.056	0.139	0.019*
sig	Sgn	0.023*	0.065	0.155	0.101	0.006 [†]
sig	Scm	0.006 [†]	0.019*	0.019*	0.136	0.021*
sig	Tre	≤ 0.001 [‡]	0.013*	0.092	0.072	≤ 0.001 [‡]

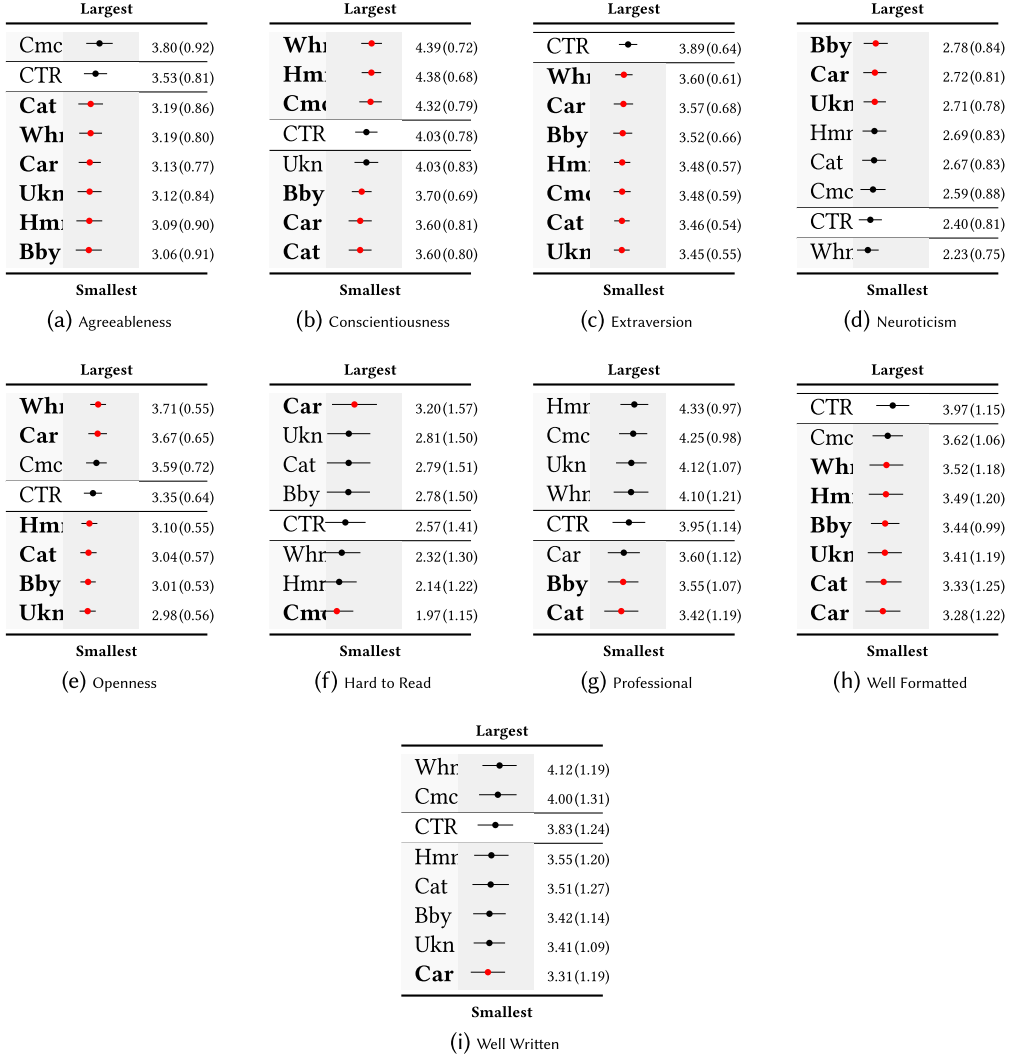
Class	Format	Hard to Read	Professional	Well Formatted	Well Written
avt	Bby	0.435	0.050*	0.008 [†]	0.061
avt	Cat	0.398	0.015*	0.005 [†]	0.158
avt	Hmn	0.076	0.051	0.029*	0.210
avt	Car	0.019*	0.083	0.001 [†]	0.018*
avt	Ukn	0.368	0.395	0.011*	0.052
avt	Cmc	0.012*	0.128	0.084	0.465
avt	Whm	0.315	0.488	0.039*	0.194
sig	Lgo	0.095	0.114	0.521	0.131
sig	Trd	0.426	0.103	0.103	0.507
sig	Phn	0.466	0.061	0.014*	0.040*
sig	Rlg	0.145	0.047*	0.028*	0.088
sig	Sgn	0.295	0.396	0.022*	0.177
sig	Scm	0.251	0.045*	0.156	0.258
sig	Tre	0.358	0.378	0.010 [†]	0.158

* < 0.05; [†] < 0.01; [‡] < 0.001; Non-significant comparisons are in gray.

No manipulation of an email's presentation will make the sender appear to have a higher degree of Agreeableness (Appendix Table B1) or lower degree of Neuroticism (Appendix Table B4). Further, tested variations will not *improve* the perceived formatting (Well Formatted, Appendix Table B8) nor how Well Written (Appendix Table B9) the content is.

The two dependent measures that can be manipulated to be perceived more positively by more than one variation are Conscientiousness and Openness. To appear more Conscientious, senders can employ numerous techniques, from manipulating their Profile Avatar (Whm, Hmn, or Cmc), including social media links (Scm) or name and title (Trd) in their Signature. To increase perceived Openness, have a fun/whimsical (Whm) or cartoon (Car) Profile Avatar, or include the company logo (Lgo) in the Signature. These positive Profile Avatar impacts on Conscientiousness and Openness can be seen as paralleling the results of Lee et al. [62], which indicated a “closer” perceived communication with the Email Avatar system.

Yet none of these manipulations come without a cost. For example, although traditional Profile Avatars (Hmn) improve Conscientiousness, they also reduce perception of Agreeableness,

Table 6. Ordered Ranking of the **Profile Avatar Group** : Sparkline of Mean and Standard Deviation Bars

Note: Statistically significant pairwise comparisons of conditions vs. control are highlighted in bold and sparkline dots in red.

Extraversion, Openness, and perceived formatting (Well Formatted, Table 6). And although this does appear to contradict some results from prior work [16, 17, 27, 62], it does appear to be consistent with the work of Fong and Mar [38], which showed that even small variations in generic cartoon avatars can have impacts on BFI dimensions.

For the three remaining dependent measures (Professional, Hard to Read, and Extraversion), there appears to be only one variation that can be done for each that can statistically improve recipients' perceptions. Senders may appear more Professional by including social media links (Scm), which is consistent with prior work [32, 81], but this comes at the cost of having lower Agreeableness, Extraversion, and Openness. Surprisingly, the other more "classic" Signatures have no significant impact on how Professional the email is, contrary to other work [2, 32]. Emails can

Table 7. Ordered Ranking of **Signature** Group : Sparkline of Mean and Standard Deviation Bars

Largest			Largest			Largest			Largest		
Rlg	—●	3.80(0.86)	Scm	—●	4.34(0.64)	CTR	—●	3.89(0.64)	Phn	—●	2.79(0.82)
CTR	—●	3.53(0.81)	Trd	—●	4.32(0.66)	Sgn	—●	3.61(0.67)	Tre	—●	2.67(0.79)
Lgo	—●	3.26(0.75)	Rlg	—●	4.29(0.73)	Scm	—●	3.57(0.61)	Sgn	—●	2.66(0.89)
Trd	—●	3.25(0.86)	Lgo	—●	4.27(0.72)	Trd	—●	3.52(0.62)	Trd	—●	2.64(0.86)
Sgn	—●	3.25(0.84)	Tre	—●	4.26(0.69)	Lgo	—●	3.48(0.57)	Rlg	—●	2.61(0.72)
Scm	—●	3.17(0.83)	Sgn	—●	4.24(0.82)	Phn	—●	3.48(0.58)	Scm	—●	2.61(0.68)
Tre	—●	3.15(0.83)	CTR	—●	4.03(0.78)	Tre	—●	3.44(0.53)	Lgo	—●	2.58(0.82)
Phn	—●	3.14(0.65)	Phn	—●	3.51(0.91)	Rlg	—●	3.44(0.66)	CTR	—●	2.40(0.81)
Smallest			Smallest			Smallest			Smallest		
(a) Agreeableness			(b) Conscientiousness			(c) Extraversion			(d) Neuroticism		
Largest			Largest			Largest			Largest		
Lgo	—●	3.61(0.54)	Tre	—●	2.81(1.51)	Scm	—●	4.34(0.94)	Lgo	—●	4.10(1.11)
CTR	—●	3.35(0.64)	Trd	—●	2.78(1.47)	Trd	—●	4.27(1.00)	CTR	—●	3.97(1.15)
Scm	—●	3.10(0.55)	Phn	—●	2.76(1.53)	Sgn	—●	4.13(1.14)	Scm	—●	3.69(0.96)
Rlg	—●	3.08(0.62)	CTR	—●	2.57(1.41)	Tre	—●	4.12(0.98)	Trd	—●	3.66(0.88)
Trd	—●	3.05(0.48)	Sgn	—●	2.30(1.33)	CTR	—●	3.95(1.14)	Rlg	—●	3.51(1.11)
Sgn	—●	3.04(0.57)	Scm	—●	2.28(1.30)	Lgo	—●	3.62(1.16)	Sgn	—●	3.47(1.18)
Phn	—●	3.03(0.53)	Rlg	—●	2.21(1.30)	Rlg	—●	3.55(1.02)	Phn	—●	3.43(1.20)
Tre	—●	2.96(0.57)	Lgo	—●	2.16(1.27)	Phn	—●	3.54(1.23)	Tre	—●	3.41(1.16)
Smallest			Smallest			Smallest			Smallest		
(e) Openness			(f) Hard to Read			(g) Professional			(h) Well Formatted		
Largest			Largest			Largest			Largest		
Rlg	—●	4.20(1.11)	Trd	—●	3.99(1.27)	Sgn	—●	3.53(1.19)	Phn	—●	3.35(1.30)
Scm	—●	4.08(1.10)	CTR	—●	3.83(1.24)	Tre	—●	3.52(1.15)			
Trd	—●	3.99(1.27)				Lgo	—●	3.50(1.17)			
CTR	—●	3.83(1.24)				Phn	—●	3.35(1.30)			
						Smallest					
						(i) Well Written					

Note: Statistically significant pairwise comparisons of conditions vs. control are highlighted in bold and sparkline dots in red.

appear easier to read (lower Hard to Read) by having a cartoon (Cmc) as a Profile Avatar, which also improves perceived Conscientiousness while reducing perceived Extraversion.

Extraversion is easily impacted with a negative tone, with any and all variations making individuals appear less extraverted by doing more. In the context of Signatures, this contrasts individuals' intention to better show their authority and credibility [47, 81]. This negative impact on Extraversion and Openness may suggest that the insecurity [47] that pushes individuals “subtly” to promote and identify themselves [35] may actually be easy to spot, and causing an opposite reaction.

As a further context to the related literature, avatars of photo quality appear to have the largest benefit, which contrasts what has largely been the focus of study to this point—cartoon avatars [38, 62]. Within the context of Signature, the prevailing research shows that sender's intention is to improve communication and to add authority. However, results indicate that at best the signatures

may not align with the senders' motivation, rather making the sender appear more Professional or Conscientious.

Although the literature and actual users may justify certain self-presentation decisions, the sub-conscious reaction to these decisions often are counter to the intended effect.

7.1 Implications for Email and Email Software Design

These findings yield some concrete recommendations regarding email presentation. Some of these design recommendations target the senders (what end users can control) but may also influence how software designers or company policy makers create their products:

- DR1 Keep It Simple:** Almost every manipulation across every dimension has at best a neutral impact on the perceived personality of the sender and quality of the email. Deviating from socially accepted norms, as defined by the control group, will generally hurt rather than help. Being aware of the specific situations in which to perform particular deviations is key.
- DR2 No Pictures Please:** Avoid having a Profile Avatar. Rather than making a sender appear more personable, professional, or extroverted, Profile Avatars appear to do the exact opposite. For software designers, consider having no profile picture if users do not explicitly add one, or potentially not showing them at all.
 - DR2.1 No Babies or Cats:** Having a Cat or Baby Profile Avatar was especially negative. Both of these common Profile Avatars decrease perceived Agreeableness, Conscientiousness, Extraversion, Openness, and how Professional the sender is. And using a baby picture makes the sender appear to exhibit a higher degree of Neuroticism.
 - DR2.2 No Placeholders:** Many email clients insert a placeholder image if the end user does not upload one. This is detrimental to how both the sender and the quality of the email will be perceived.
 - DR2.3 Do not be "too" creative:** If a Profile Avatar next to one's name is required (because a placeholder Profile Avatar will be imposed), use a standard/professional picture (Hmn), a personal picture with a bit of humor (Whm), or a socially acceptable and well-established cartoon (Cmc), as these will provide some benefits over the placeholder Profile Avatar (Ukn).
- DR3 Simplest of Signatures:** In general, anything more than the sender's name in a Signature is not useful. Even Signatures with the sender's title and company (Trd) have a negative impact (reducing perceived Openness and Extraversion), which runs counter to some of the theories on Signature value-add [2].
 - DR3.1 Your Phone Is Not an Excuse:** People often include (or set by default) a Signature notifying the recipient that the message was sent from a mobile device (perhaps attempting to exhibit Conscientiousness about any brevity or errors). In reality, that signature (Phn) does the exact opposite and is the only Signature that was found to have a statistically significant negative impact on perceived Conscientiousness. It also reduces Agreeableness, Openness, and the email's perceived quality (Well Written, Well Formatted), regardless of actual errors.
 - DR3.2 Social Media Has Social Benefits:** Although including one's social media contacts (Scm) reduces Agreeableness, Extraversion, and Openness, it does appear to be a Professional alternative to the Signature and makes the sender appear Conscientious (helping the recipient find out more about the sender). For some senders, this may be a reasonable trade-off given certain job settings or email contexts that may require a signature.

DR4 Presentation: Following the adage “It’s not what you say, it’s how you say it,” variations in email presentation directly affects recipients’ perception of the quality of the email itself. Even when the content is controlled, presentational changes can positively or, more likely, negatively impact how Well Written the email content appears.

7.2 Theoretical Implications: Halo Effect

Although this is only one study, this article does suggest the potential of a parallel between the impact of non-content presentation changes and the psychological theory behind the Halo Effect. Just as the Halo Effect—a form of confirmation bias—describes how initial positive (negative) impressions (unrelated to work or performance) can cause neutral performance to be viewed positively (negatively), this work may suggest that the same impact occurs with email. The results from this study clearly show that without changing the email content (representing the sender’s “performance”), the initial and closing impression can color the perception of the content (the worker’s performance). Further, participants had no prior knowledge of the sender, allowing us to control and measure impact explicitly. Without doing further work that directly parallels that on the Halo Effect [26, 102, 107], it cannot be known how closely the results of this study and the existing literature align.

8 LIMITATIONS

Much like the work of Harrison et al. [48, 49], this one article does not perform an exhaustive study of every possible email presentation variation. Like any highly controlled laboratory study, the results may have limited ecological validity. Just as a loading widget [48, 49] can be impacted by the value-add of an application, or prior experience with that application’s loading time, so too could a prior relationship with an email sender impact our reaction to presentation variables.

Likewise, our MT participants may not fully be representative of traditional workplace “knowledge workers,” as MT does not provide demographic or employment information for selecting participants. Likewise, although selecting “high-quality” participants (95% approval rate and at least 500 approved HITs) is common practice in MT studies [100], and although not traditionally considered screening, this may have eliminated “valid” participants from our pool. Likewise, without any demographic data provided by MT, this study cannot indicate the impact of demographics on the results.

As this experiment relied on real-world email body copy (from the Enron dataset), some emails did have overlap with multiple BFI indexes. Although our email selection criteria (outlined in Section 5.7) attempted to minimize BFI overlap, this may present an experimental confound.

Only by conducting this first well-controlled study can researchers focus future work in a more ecologically valid context (controlling for more aspects of demographics, education, profession, and more).

9 FUTURE WORK

One direction of potential future work is to delve into more variations of Profile Avatars. For example, do all cartoons elicit the same reaction as Cmc? Likewise, how whimsical or humorous can a Profile Avatar be before becoming detrimental? What defines the scope of a “serious” or “professional” Profile Avatar? And last, does there exist some other type of placeholder Profile Avatar that does not have a negative impact?

Future work could examine these aspects of the sender’s background (race, age/generation, culture, and gender implied simply by the sender’s name). This could be exceedingly fruitful, as related work has examined the impact of gender/age in resumes [13] and email addresses [6]. Another interesting future exploration would be to manipulate these variables in the context of the email

body copy, or even the Profile Avatar. Likewise, this study did not determine if certain presentation variations impact one content type more than others. Future work could examine different types of content (both Berkeley 4.x Tone categories and topic domain), or content outside of the professional environment.

The work of Shen et al. [93] presented an intriguing model to capture user's personality directly from their email content. A future study could be done to compare and contrast perceived personality (this work) from observed personality (that of Shen et al.) from Berkley's recorded personality methodology. This could shed light on how much personality could shift based on observer and methodology.

The most obvious direction of future work is to apply a few select dimensions to a real-world context—and determine the impact of these presentations on long-standing relationships between senders and receivers, and determine the impact of these factors on how users perceive and interpret these presentation choices. However, it should be noted that performing a large N real-world study in an enterprise context (with real emails) would be a significant undertaking and involve many privacy and legal issues.

Finally, to explore some of the theoretical implications of this work, additional studies could be conducted to determine how closely the impact of these non-content decisions follows the research on the Halo Effect—for example, how heavily does the bias formed by these initial and closing impressions allow a reader to overlook an email with spelling or grammatical errors, or even content that is provocative or offensive?

10 CONCLUSION

This study has shown that before an email's content is even written, the design decisions made by a sender (or software) can impact how the content and the sender will be perceived. Many of the commonplace presentation decisions made by end users (e.g., including a “sent from iPhone” Signature) are shown to have negative impacts. Further, these results suggest a potential theoretical parallel between non-content presentation changes' impact and the psychological principle termed the *Halo Effect*. By conducting 15 qualitative semi-structured interviews, and a tightly controlled study of 14 email variations with 900 participants, it is our hope to better inform email senders about how they and their emails may be received, and to spur future research into the implications of email presentation. To distill these findings, results calculated along the BFI personality dimensions and four additional questions were synthesized into five design recommendations that can help guide both email software designers and end users. Broadly speaking, we have identified the importance of simplicity for Signature and positive impact of not having a Profile Avatar. As indicated by our participants, being overly creative with email designs tends to negatively influence the reader's perception.

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