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WE LIKE PEOPLE WHO ARE EASY TO READ: THE INFLUENCE OF PROCESSING FLUENCY IN IMPRESSION FORMATION

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

August 2013

Acknowledgements

I must acknowledge foremost Dr. Matthew McGlone, who has been a wonderful advisor and friend, providing all of the support, criticism, and inspiration that ideally comes with those roles. I feel lucky to have had the opportunity to work with him. My dissertation committee, Dr. Jorge Peña, Dr. Anita Vangelisti, Dr. Natalie Stroud, and Dr. Matthew Eastin, as well as Dr. Mark Knapp, provided excellent comments and suggestions to improve this project. I'm also lucky to have had these folks as collaborators, friends, and mentors over the years. I'm grateful for the support of my family, who are due credit in so many ways and for so many reasons. Particular to the dissertation, my mother, Pam Merola, provided sharp proofreading and valuable feedback. My friends and peers have both motivated and distracted me throughout this process, which I am thankful for. Finally, my espresso machine provided instrumental writing support, regularly and reliably.

We Like People Who are Easy to Read: The Influence of Processing Fluency in Impression Formation

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The University of Texas at Austin, 2013

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Processing fluency describes the assessment of how easy a stimulus is to cognitively process, an assessment which can be mistakenly applied to judgments of other aspects of the stimulus. This dissertation introduces a novel approach to understanding the development of impressions from online profiles by incorporating the role of processing fluency in interpersonal judgments based on a social networking profile. 195 participants (155 females) were asked to view the "about me" section of a social networking profile, which had been manipulated according to one of three fluency conditions to be harder or easier to process. Participants completed scales assessing liking, similarity, trust, and compatibility, and their disclosure was measured in an open-response item. Confirming expectations based on the processing fluency literature, each of these variables was increased in the high fluency profile condition. No differences in these variables were found between the low fluency conditions and a control condition, and analysis revealed that the manipulations intended to lower fluency may have been too salient to participants. Broadly, this study shows that processing fluency can influence impression formation from online profiles across a number of meaningful relational variables.

Enhancing processing ease may allow online interactants a relational "jump-start," increasing liking, perceptions of similarity, trust, compatibility, and disclosure. These findings hold important implications for the role of processing fluency in computer-mediated communication and for models of online relationship development.

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Chapter 1: Introduction

As people continue to meet and develop relationships online for the purposes of friendship, collaboration, commerce, and love, understanding how impressions form is important work. We rely on a variety of means to form impressions (Ambady & Rosenthal, 1993; Gosling, Ko, Mannarelli, & Morris, 2002; Vazire & Gosling, 2004), and can sometimes be quite accurate at these judgments if motivated by goals (Neuberg & Fiske, 1987) or given the opportunity to observe non-verbal behavior (Ambady & Rosenthal, 1993). However, in computer-based interaction the opportunity for non-verbal communication is sometimes missing, and people generally tend to hold on to early impressions even in the face of subsequent disconfirming evidence (Gawronski, Rydell, Vervliet, & De Houwer, 2010). Early decisions about affiliation and trust can have long-term effects on relational outcomes (Sunnafrank & Ramirez, 2004). Relationships may not develop past an initial acquaintance if interactants don't like one another or see other benefits in the relationship (Altman & Taylor, 1973). First impressions are also particularly influential when deciding whether to trust another person. Trust is expected in many interpersonal settings (Burgoon, LePoire, & Rosenthal, 1995) and early violations of trust, or "getting off on the wrong foot," can be strongly influential throughout the remainder of the relationship (Lount, Zhong, Sivanathan, & Murnighan, 2008).

Despite the immediate and long-term importance of accurate interpersonal impressions, people routinely make many errors when forming them. For instance, when

attempting to gauge others' dispositions, we fail to account for situational (rather than internal) factors that might account for their behavior (e.g., Ross, Amabile, & Steinmetz, 1977), and sometimes do a poor job of incorporating all of the information we have available (Gilbert & Malone, 1995). We also ignore our own idiosyncratic knowledge (Keysar, 1994) and limit the accuracy of our judgments through our own set of internal biases (Hoorens & Nuttin, 1993) and a reliance on shortcuts (e.g., Tversky & Kahneman, 1973). Finally, we occasionally mistake or "misattribute" our affective experience and attitudes to incorrect sources (Dutton & Aron, 1974), as well as fail to account for their influence on our judgments and impressions (Schwarz & Clore, 1983; 2003; 2007). In sum, our own biases frequently create difficulties in impression formation and decision making.

These sorts of errors are particularly problematic in computer-mediated communication (CMC). In some circumstances, information that could disconfirm inaccurate impressions (Lea, Spears, & de Groot, 2001) or be used to as the basis for judgment (e.g., non-verbals; Ambady, Bernieri, & Richeson, 2000; Burgoon & Hale, 1988) is scarce or missing in CMC - for example, unacquainted individuals collaborating in a work group, engaging in commerce, or discussing ideas on a message board. At first acquaintance, people commonly use prototypes (Jacobson, 1999) and stereotypes (Eply & Kruger, 2005) to form impressions of one another. These knowledge sources may be unduly influential when people rely on them in order to compensate for the paucity of information at the outset of an interaction (Reicher, Spears, & Postmes, 1995; Walther, 1992). In the absence of sufficient information, interactants may fill in their own

expectations (Lea & Spears, 1995) and develop exaggerated "hyperpersonal" impressions of one another (Walther, 1996). Thus, errors in judgment may be enhanced when people attempt to form impressions through computers.

This dissertation investigates a misattribution effect likely to be particularly significant when individuals meet and interact through technology. A large body of work investigates how "processing fluency" – that is, the ease with which a stimulus is processed - influences judgments of a stimulus unrelated to ease of processing. For example, Song and Schwarz (2008) observed that the font in which a dinner recipe was encoded influenced judgments of its creativity and anticipated quality. When encoded in a font that was easy to read, the recipe was judged to be more interesting and likely to produce a tastier product than when presented in a font more difficult to process. Fluency misattributions of this sort have been documented in decision making, problem solving, aesthetic judgments, and other behavioral domains. The effects of processing fluency are well-documented, but have yet to be explored in online impression formation.

The project constitutes an initial exploration, employing manipulations of fluency within a social networking profile evaluation paradigm. The work described in this dissertation explores whether the alteration of the fluency with which an online profile can be processed will influence liking, trust, and other social outcomes at the outset of a relationship. An experiment compared four fluency conditions: two in which the background-contrast of the profile's font was altered to make it more difficult or more easy to read, a common method of inducing variation in fluency (e.g., Hansen, Dechêne,

& Wänke, 2008), a standard condition with regular font, and a third condition using a commonly occurring source of disfluency online – a popup window improperly sized to display its information. Users of mobile and tablet technologies frequently struggle with applications that aren't properly developed for their computing device, resulting in displays that don't fit the information (e.g., Bonnington, 2012).

This investigation of the influence of processing fluency on impression formation in CMC is important for a number of reasons. The nature of online communication creates many opportunities for encountering stimuli that are perceptually disfluent. The bulk of communication online occurs in text format, either in chat or on social networking sites (SNS) or other online profiles. These profiles do frequently feature photographs and occasionally videos, but most of the demographic (e.g., gender, hometown, etc.) and psychographic (e.g., entertainment preferences, pet peeves, etc.) information provided is in text format.

The affordances of CMC that people strategically exploit to manage the impressions they cast or to form impressions of others have received considerable research attention in recent years (e.g., Ellison, Heino, & Gibbs, 2006; Ramirez, Walther, Burgoon, & Sunnafrank, 2002; Walther, 1996). However, there are other properties of this medium that most users neither control nor are even aware of that nonetheless can influence impressions. In particular, there are numerous sensorial dimensions of computer text and graphical interfaces that affect "processing fluency" -- i.e., the ease with which the textual or graphical information is processed. The impact of font

characteristics (shape, size, contrast with background, etc.) on processing fluency is well-documented (Song & Schwarz, 2008), and thus the textual portion of online profiles is likely fertile ground for fluency effects.

A second reason why fluency is important to study in online impression formation is because many of the relationships formed in CMC are principally mediated by technology. As such, "getting off on the right *font*" is particularly important. Prominent theories addressing impression formation and relationship development in CMC note that early relationships are particularly at risk for overattribution due to sparse information available for impression formation (e.g., Lea & Spears, 1992; Walther, 1996). Knowing little about others beyond their category memberships (e.g., "skateboarder") leads to impressions formed solely on the basis of salient aspects of those categories.

CMC interactions are frequently visually anonymous and thus lack nonverbal information, which can be important in making accurate judgments about others (Ambady et al., 2000; Burgoon & Hale, 1988). Instead, others' group affiliation (Lea, Spears, De Groot, 2001) and interpersonal goals and behavior (Walther 1996; 1997; Wang, Walther & Hancock, 2009) have increased importance when forming impressions, which can result in skewed judgments. In the absence of disconfirming information or opportunities to observe others, the impressions generated may be particularly powerful and persistent. Research has demonstrated that processing fluency can influence important variables such as liking (e.g., Reber, Winkielman, & Schwarz, 1998), so given

that CMC users may form inaccurate yet enduring impressions of one another, it is important to understand the role of processing fluency in impression formation online.

Chapter 2: Processing Fluency Framework and Hypotheses

PROCESSING FLUENCY

Misattribution of affect or information can skew judgment during impression formation. Misattribution occurs when people fail to account for the source of an affective state and instead attribute it to an unrelated stimulus. For instance, a study by Dutton and Aron (1974) demonstrating misattribution of arousal found that males who had just crossed a swaying bridge reported more attraction to a female confederate immediately after crossing a fear-arousing swaying rope bridge than after they had time to recover and rest. Highlighting the classic misattribution phenomenon, the men who weren't given time to recover misinterpreted their heightened physiological arousal to romantic attraction rather than the true source, the dangerous bridge. Another form of misattribution occurs when we use mood or affect as information (Schwarz & Clore, 1983; 2003; 2007). For example, phone survey respondents interviewed on days with poor weather reported less career and life satisfaction than others interviewed on days with good weather, indicating that the transient emotional experience of both groups informed their assessments of ostensibly enduring conditions (Schwarz & Clore, 1983). This dissertation investigates a related but distinct misattribution effect, in which the ease with which a stimulus is cognitively processed, termed *processing fluency*, inappropriately influences judgments of other stimulus aspects.

Initial studies of processing fluency phenomena focused chiefly on psychophysical outcomes of misattributing processing fluency to other dimensions, such as judgments of loudness (e.g., Jacoby, Allan, Collins, & Larwill, 1988), transparency

(e.g., Whittlesea, Jacoby & Girard, 1990), and sound duration (e.g., Witherspoon & Allen, 1985). However, in recent years the focus has shifted to higher-order conceptual and attitudinal outcomes. For example, McGlone and Tofighbakhsh (2000) manipulated processing fluency by presenting unfamiliar British aphorisms to American college students in either their original rhyming form (e.g., *Woes unite foes*) or a semantically equivalent non-rhyming form (e.g., *Woes unite enemies*). The rhyming versions were consistently judged to be more accurate descriptions of human behavior than the non-rhyming versions. Similarly, new stock offerings with less pronounceable names do not sell as well others that are more pronounceable, at least in the short term (Alter & Oppenheimer, 2006). The range of outcomes reported in processing fluency research demonstrates that processing fluency affects judgments of stimuli ranging from basic (tones, polygons, etc.) to complex (words, social networking profiles, etc.) stimuli.

The processing of any stimulus can be characterized by a variety of parameters that are orthogonal to its intrinsic properties, such as the speed and accuracy of its processing (Reber, Wurtz, & Zimmermann, 2004), and these parameters are associated with the common experience of processing "ease" (for reviews see Clore, 1992; Jacoby, Kelley, & Dywan, 1989; Whittlesea et al., 1990). In other words, every experience ranges from "*effortless* to *highly effortful*, which produces a corresponding metacognitive experience that ranges from *fluent* to *disfluent"* (Alter & Oppenheimer, 2009a, p. 220).

There are several broad factors that influence processing fluency and also various outcomes associated with altering fluency. For instance, perceptual fluency (i.e., the ease

with which a stimulus is psychophysically apprehended) can be influenced by altering the contrast between the color of text and its background (Reber & Schwarz, 1999), attempting to read a page printed with low toner (Oppenheimer, 2006), or a number of other means. Linguistic fluency has been manipulated by McGlone & Tofighbakhsh's (2000) alteration of rhyming aphorisms, as described above, but has also been altered by presenting participants with pronounceable or unpronounceable strings of letters (e.g., Alter & Oppenheimer, 2006). For a recent review and taxonomy of the various manipulations shown to influence processing fluency, see Alter and Oppenheimer (2009a).

In CMC, some factors that influence fluency are more likely to vary than others. Much information is presented textually in social networking sites and webpages. Linguistic fluency could be modified by word usage (Oppenheimer, 2006) or stylistic cues (alliteration, assonance, rhyme, etc.; McGlone & Tofighbakhsh, 2000). Other avenues through which processing fluency has been manipulated, such as control of facial feedback (Tamir, Robinson, Clore, Martin, & Whitaker, 2004), are less likely to be widely encountered in CMC. Another common aspect of processing ease that might vary in CMC is perceptual fluency, the ease of psychophysically apprehending a stimulus. For example, a word presented textually that is occluded by visual distracters (e.g., pop-ups), or a word presented auditorily in a field of noise, is more difficult to apprehend than in the absence of extraneous stimuli and thus may be perceptually disfluent (e.g., Whittlesea et al., 1990). In addition, a photographed object may be hard to recognize because the photo is heavily pixilated or grainy (Sansom-Daly & Forgas, 2010). In CMC, users are

likely to encounter perceptual disfluency in the form of difficult to read text due to poor background contrast or font size. The present study is an attempt to introduce a robust array of interpersonal perception variables for which variability in processing fluency may produce social attributional consequences (e.g., Bradac, Hosman, & Tardy, 1978).

FLUENCY EFFECTS

Although the processing fluency that people experience may derive from multiple factors, research suggests that these factors activate a common set of cognitive mechanisms. When McGlone and Tofighbakhsh (2000) manipulated linguistic fluency, they found that aphorisms that rhymed and were thus more fluently processed were judged as more likely to be true than those that did not, analogous to findings reported by Reber and Schwarz (1999) on the effects of perceptual fluency. Through two different manipulations, these two studies arrived at similar effects. Alter and Oppenheimer (2008a) completed a series of studies in which they employed different approaches to manipulating processing fluency, but measured similar outcome variables. In these studies, they manipulated perceptual fluency by using fonts that were difficult to read, conceptual fluency by subtly presenting words related to the stimulus, and linguistic fluency by using easier or harder to pronounce words. These manipulations resulted in similar effects on the outcome variables, and in each study it was demonstrated that lowering the ease of processing a stimulus increases people's propensity to describe it using more abstract (e.g., "New York's lights, shimmering in the foggy sky, remind me of outer space") than concrete (e.g., "New York is a large city with five boroughs and about 18 million people") descriptions. This and other studies in the literature which

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report similar outcomes despite different manipulations of processing fluency indicate there are a common set of mechanisms underlying the phenomenon. As such, it's important to note that various, interchangeable manipulations of processing fluency can be used to demonstrate the same basic effect: misattribution of information regarding processing ease to other, unrelated judgments.

The mechanisms through which highly fluent processing influences evaluation of the stimulus are twofold: creating the impression of familiarity (e.g., Bornstein & D'Agostino, 1992) and stimulating positive affect (e.g., Reber, Schwarz, & Winkielman, 2004). Fluency elicits familiarity because things that are easy to process often (but not always) have been encountered before. Zajonc's (1968) account of the mere exposure effect, which can be conceived as a processing fluency phenomenon, posits that repeated exposures to a stimulus induce positive affect toward the stimulus. As a result of this cued familiarity, positive emotions are generated and liking toward the stimulus is increased (Bornstein, 1989; Monahan, Murphy, & Zajonc, 2000). Other researchers propose an unmediated link between fluency and positive affect (e.g., Winkielman, Schwarz, Fazendeiro & Reber, 2003), and researchers have sometimes had difficulty detecting familiarity effects in paradigms with stimuli more complex than symbols (e.g., Moreland & Beach, 1990).

Several demonstrations of the correlation between positivity towards a stimulus and its familiarity have been reported in the social cognition literature. For example, more attractive (and thus perceived as more positive) stimuli are rated as more familiar

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(Monin, 2003), and people are more likely to mistake appealing stimuli as familiar (Corneille, Monin, & Pleyers, 2005) than neutral or unappealing ones. Words are more likely to be considered "old" than "new" (familiar versus unfamiliar) when participants are put in a positive mood (Phaf & Rotteveel, 2005) than in a neutral or negative mood. Average or prototypical stimuli (which are easy to process) cue a positivity response as well – watches, faces, and birds that are more prototypical tend to be liked more than less typical examplars (e.g., Halberstadt & Rhodes, 2000). It has also been proposed that fluency itself cues positive affect (e.g., Winkielman, et al., 2003; Winkielman, Halberstadt, Fazendeiro, & Catty, 2006). Bio-feedback research detecting subtle zygomatic contractions indicate positive affect in response to stimuli that are easier to process (Winkielman & Cacioppo, 2001). For the purposes of the present studies, whether positive affect follows familiarity or they occur at the same time is secondary, as judgments occur nearly instantaneously (Winkielman, et al., 2006).

The familiarity and positive affect stemming from highly fluent processing also affects liking of the stimulus (e.g., Sluckin, Comlin, Hargreaves, 1980). For example, participants who are exposed to a photo of a human face multiple times (thus easing image processing) indicate that they find the face more attractive and that they believe they would like the person depicted in the photo more than those who only have one exposure to a face (Rhodes, Halberstadt, & Brajkovich, 2001). The effect of eased processing on liking also extends to judgments regarding stimuli that are merely similar to a previously seen stimuli; for example, people who are exposed to a set of other-race faces show increased liking towards a novel set of other-race faces (Zebrowitz, White, &

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Wienke, 2008). Participants in Zebrowitz et al.'s (2008) study reported feeling the novel set of faces were more familiar, an effect which mediated the increase in liking.

Many fluency researchers argue that misattribution is at the heart of fluency effects, because perceivers experience positive affect and familiarity resulting from the ease of processing but fail to accord these feelings to their actual source; instead, they attribute it to other more immediate or salient stimulus attributes (Clore, Gasper, & Garvin, 2001). In essence, fluency creates a condition similar to affective priming (Payne, Cheng, Govorun, & Stewart, 2005). In one affective priming study, participants were flashed photos pretested to prime positive (e.g., a picture of a baby) or negative affect (e.g., a picture of a spider). Immediately following exposure to one of these photos, a Chinese ideograph was shown and participants were asked to rate how "pleasant" it was. Ratings were higher following the positive than negative prime, ostensibly because participants misattributed the positive feeling elicited by the prime to the ideograph stimulus. Bornstein (1989) achieved similar results through subliminal presentation of a Chinese ideograph before showing it to participants and asking them to rate it. Liking and preference for the ideograph was higher than that of a control ideograph that was not subliminally presented earlier, consistent with Zajonc's (1968) mere exposure effect.

Just as in classic misattribution studies (e.g., Schwarz & Clore, 1983), the misattribution effects of fluency are attenuated when people are aware of the actual source of fluency change. For example, people who are aware of pre-exposure to a stimulus do not show increased liking after a second exposure, whereas those who are

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exposed to the stimulus imperceptibly the first time do (Winkielman & Cacioppo, 2001). When participants experience disfluency, the effects disappear if their attention is drawn to poor room lighting (a likely source of their difficulty; Shen, Jiang, & Adaval, 2010). Oppenheimer (2006) found that participants who could directly attribute low fluency to a cause (the low-toner printer page they were reading) actually overcompensated in response to the difficulty of processing the source, judging an author as more intelligent than those who read a passage printed with a normal toner level. Susceptibility to linguistic fluency was also attenuated when participants were encouraged to discount the aesthetic qualities of rhyming aphorisms (McGlone & Tofighbakhsh, 2000). In sum, when people can attribute the emotion or familiarity they feel toward a stimulus other than the source, fluency's impact on judgment is greatly diminished (Novemsky, Dhar, Schwarz, & Simonson, 2007). As such, manipulations must be somewhat subtle or stimuli must be captivating; as Alter and Oppenheimer (2009a; p. 231) note, "people attribute fluency to the most obvious and available cause, regardless of how it is induced."

Using this tendency to attribute fluency to whatever is likely and salient, Fang and colleagues (2007) designed a study to clarify whether the effects of fluency on judgment were the result of feelings of familiarity toward the stimulus, positive affect, or some mechanism in which affect and fluency interact in judgments. Participants were repeatedly but subtly exposed to a webpage banner ad with pleasant background music playing, and then asked to rate how positive their reactions were to the banner. The researchers warned some groups of participants that their judgment may be influenced by

the fluency with which the stimulus is processed, and others were warned that their feelings may influence their judgment. A third group was given warning that the background music (in particular) could influence their judgment, and a fourth group was given no warning. The first two groups, warned specifically about fluency and affect, were equivalent and reported significantly lower positivity towards the banner ad than the particular affect warning and control group. Because participants in the first two groups were able to attribute their feeling of fluency or familiarity to a source, they did not misattribute it to the banner stimulus. Since a warning removed the positivity effect for both the familiarity and affect conditions, the researchers inferred that both familiarity and positive are elicited by processing fluently and both must be present for it to influence the banner ad ratings. Other research (De Vries, Holland, Chenier, Starr, & Winkielman, 2010) has demonstrated that externally creating a positive mood removes preference for familiar stimuli, supporting claims (e.g., Fang, Surendra, & Rohini, 2007) that familiarity and positive affect act in tandem to generate the effects of high fluency.

Numerous studies report that fluency influences judgments in areas extending beyond familiarity or liking. For example, moral violations that are presented in a manner likely to encourage fluent processing (e.g., an easy to read font) are judged as less of a trespass than those presented in a manner that impairs processing (e.g., a difficult to read font; Laham, Alter, & Goodwin, 2009). Rollercoasters that have difficult to pronounce names (e.g., *Vaiveahtoishi*) are more likely to be rated as fun and exciting, but also rated as likely to make a rider sick (Song & Schwarz, 2009). Research findings that are presented with names (e.g., the *Optimal Distinctiveness Theory*) and thus easier to

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process are rated as more memorable yet also less important than when they are presented without the name (Labroo, Lambotte, & Zhang, 2009).

To unify these findings, Schwarz (2004) proposed that people's metacognitive judgments interpreting information about a stimulus are guided by their own naïve theories about how the world works. According to Schwarz (2004), when asked to make judgments beyond simple impression of affect or familiarity, people employ a naïve theory to bridge the gap between the information they have available and the judgment they are asked to make. As such, interpretation of how positive affect or feelings of familiarity toward the stimulus should be construed beyond basic impressions depends on what judgments are required. For example, Labroo and colleagues (2009) asked participants to consider either how memorable a research finding is or how understandable it is. Some participants read research findings prefaced with a name for the effect (e.g., the *Optimal Distinctiveness Theory*), which rendered the finding easier to process, while others read only the finding. All participants then rated the research on how important is was. When evaluating importance, participants brought different naïve theories to bear depending whether they had considered the memorability of the research or the ease of understanding. The theory in the named (easy to process) condition was rated as important by participants considering memorability, presumably because research that can be recalled easily is more important. However, participants considering understandability rated the theory in the named conditions as less important, because they inferred that research that is easy to process isn't as important. Other research has shown that interpretations according to naïve theories are malleable and can be changed by a

number of factors: current goals (Freitas, Azizian, Travers, & Berry, 2005; Pocheptsoba, Labroo, & Dhar, 2009), a person's beliefs regarding whether easy processing is positive or negative (Briñol, Petty, & Tormala, 2006), or other sorts of training designed to alter how information is interpreted (e.g., Unkelbach, 2007).

In sum, the path from encountering a stimulus to rendering an appraisal of its attributes takes place in three stages (Alter & Oppenheimer, 2009a). The first is cognition, in which a stimulus is psychophysically and perceptually apprehended (e.g., a high background contrast statement is read, and increased processing eased is experienced). In the second stage, information regarding processing ease is misattributed to other aspects of the stimulus (e.g., impressions of familiarity and positive affect as associated with the previous read statement). The second stage is also when naïve theories may also be engaged (e.g., the familiarity of this statement means that it is has been heard before and is likely true). In the third stage, a domain-specific judgment is made (e.g., this statement is true). This is the process through which an easy-to-read statement (which seems familiar) is judged as likely to be true (as in Reber & Schwarz, 1999) or a geometric pattern that is easy to process is associated with positive affect and judged as more likeable (Reber et al., 1998).

Until now, this literature review has largely focused on the effects of high fluency - that is, encountering a stimulus that is processed more fluently than baseline. However, individuals may also encounter stimuli that are more difficult to process (particularly online, as noted above) than the norm or baseline. Evidence suggests that encountering a

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stimulus that creates disfluency has results complementary to those of high fluency – namely, instead of positive affect and perceived familiarity, disfluency stimulates negative affect and perceived unfamiliarity. There have been fewer direct tests of the mechanisms behind disfluency effects, but Alter and Oppenhimer (2009b) report that negative emotions may be a mediator. However, Song and Schwarz (2009, study 3) suggest that negative affect was not influential in their findings regarding risk perceptions of product names. Their study used harder or easier to pronounce rollercoaster names, finding that unfamiliar names are rated as riskier on both positive (excitement, adventurous) and negative (likely to make one sick) criteria, depending on which the participant is evaluating. Song and Schwarz (2009) thus believe that disfluency associates the stimulus with feelings of riskiness, which can be interpreted positively or negatively according to whether a person is asked to consider excitement or likelihood of sickness.

However, Pronin and Jacobs (2006) experimentally manipulated the speed of participants' thoughts through a variety of means; for example, modifying the speed at which type appears on a screen, playing a silent movie at a faster or slower rate, or asking participants to find rhymes for easier or harder words. Following thought-speed increasing tasks (e.g., presenting a series of ideas slightly faster than normal silent reading speed), participants reported higher feelings of positive affect compared to baseline tasks, while during thought-slowing tasks (e.g., presenting the ideas nine times longer than normal silent reading speed) their affect was lower than baseline. This suggests that the disfluency associated with thought disruption may indeed have some effect on mood.

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More coherent is the evidence that disfluency signals unfamiliarity. In a series of studies, participants were presented names of ostensible food additives that were judged as easier (e.g., *Magnalroxate*) or harder (e.g., *Hnegripitrom*) to pronounce. The additives with difficult-to-pronounce names were rated as more hazardous (risky), an effect which in turn was partially mediated by participants' reports of how familiar the additives' names seemed to be (Song & Schwarz, 2009, study 2). Alter and Oppenheimer (2008b) asked participants to estimate how much a standard or nonstandard form of currency could purchase. They found that, though the currencies were ostensibly valued the same, participants believed the nonstandard currency had less value, an effect which was mediated by the participants' reported familiarity with the nonstandard currency. Thus the available evidence indicates that disfluency cues unfamiliarity, which may lead to perceptions of risk or other outcomes (Alter & Oppenheimer, 2008b; Alter & Oppenheimer, 2009b).

INTERPERSONAL PROCESSING FLUENCY

Forming impressions of others is a highly complex process, involving attention, motivation (Fiske 1988; Neuberg & Fiske, 1987), and careful information-gathering (Gosling et al., 2002). Research on processing fluency has shown that the phenomenon can interfere in the impression formation process when information regarding the ease with which a stimulus associated with an individual is processed is applied to judgments of the individual in other unrelated areas (e.g., intelligence; Oppenhimer, 2006). A wide range of interpersonal judgments can be influenced by misattribution of familiarity and affect and subsequent interpretation of these feelings according to situational demands.

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An early demonstration of processing fluency affecting interpersonal perception is a study of friendship in an apartment building (Festinger, Schachter, & Back, 1950). Residents in the apartment building were more likely to be friendly with those they were exposed to frequently, either by proximity or likelihood of encountering, fitting with later accounts by Zajonc (1986) in which repeated non-negative exposure increases liking. Other studies have found that the likability and similarity ratings of a classmate increased with the frequency with which the person attended a class with them (Moreland & Beach, 1992). These studies and other research show that repeated exposure allows easier processing of some aspect of others, and that this increases positive social impressions of them. This mere exposure phenomenon has been largely subsumed into processing fluency theorizing as an example of a way to ease cognitive processing; previous exposures to a stimulus make it easier to retrieve it from memory (Alter & Oppenhimer, 2009a; Bornstein & D'Agostino, 1992).

On the other hand, decreasing the fluency with which a stimulus associated with an individual can be processed usually results in negative impressions. For example, Sansom-Daly and Forgas (2010) found that people were rated as less likable when they were presented in blurred photos than in un-blurred ones. In another study, migrants were rated overall more negatively on measures of traits such as honesty and kindness compared to an ingroup, an effect researchers attributed to cognitive difficulty (disfluency) when thinking about individuals belonging to other groups (Rubin, Paolini, & Crisp, 2010). Judgments of intelligence can also be influenced by disfluency. Oppenheimer (2006) asked participants to judge the intelligence of an essay writer and

manipulated the fluency of the writing by preparing a "highly complex" version that replaced words with longer synonyms. Their results show that more verbiage is associated with a less intelligent author, ostensibly resulting from impaired fluency.

The body of processing fluency literature suggests that people will form more positive interpersonal impressions when a stimulus associated with a person is easy to process compared to when it is difficult to process. Applied to the present study, it is predicted that a number of interpersonal judgments will be more positive for an individual whose social networking profile is presented in a high contrast (and thus easier to read) font than when the profile is presented in a low contrast font.

In particular, liking is expected to be influenced by fluency. The literature on processing fluency demonstrates numerous examples in which high processing ease increases liking (e.g., Rhodes et al., 2001) and low processing ease decreases it (e.g., Sansom-Daly & Forgas, 2010). As such, a profile that is easier to process should be liked more than a less fluent profile. Importantly, the effect of fluency liking should also mediate other interpersonal perceptions. Reber and colleagues (2004) propose that fluency primarily creates positive affect, which is displayed in increased liking towards a stimulus. This evaluation occurs near-instantaneously with the processing of the stimulus (Winkielman, et al., 2006), and thus should be available and influence subsequent judgments. Thus, it is predicted that liking will mediate the connection between processing fluency and the other interpersonal judgment variables in this study. These specific hypotheses are represented individually in later sections.

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H1: *Profile processing fluency will be equated with target likability, such that targets will be perceived as less likeable under low fluency than high fluency processing.*

A person in a profile that is processed more fluently should also be rated as more similar to the perceiver than the person featured in a difficult to process profile. Several studies have demonstrated that judgments of interpersonal similarity are increased with fluent processing of a stimulus (Moreland & Zajonc, 1982; Moreland & Beach, 1992), and perceptions of similarity are created by feelings of familiarity and liking towards the stimulus (Moreland & Topolinski, 2010). Much research in the interpersonal domain promotes the idea that friendship develops from liking and perceptions of interpersonal similarity (e.g., Newcomb, 1961; Byrne, 1971). Thus, a person with an easy to process profile should seem more suitable for friendship because they are liked more and perceived as more similar.

H2a: *Profile processing fluency will be equated with target similarity, such that targets will be perceived as less similar under low fluency than high fluency processing.*

H2b: *The effect of processing fluency on similarity will be mediated by liking.*

H3a: *Profile processing fluency will be equated with target compatibility, such that targets will be perceived as less compatible under low fluency than high fluency processing.*

H3b: *The effects of processing fluency on compatibility will be mediated by similarity and liking.*

Experiencing fluency or disfluency when processing a social networking profile is also expected to influence judgments of the author's trustworthiness. Johnson-George and Swap (1982) define trustworthiness as a judgment that takes place in the presence of risk, as compared to defining trust according to a global tendency to trust or not trust others (Rotter, 1971). As such, trust varies according to context and scenario. Green (2007) reports that perception of others' personality variables, such as friendliness and intelligence, also influences trust. As people attempt to assess the interpersonal trustworthiness they generally use perceptions of credibility, competence, and likeability (Burgoon et al., 2002). Liking has been found to be an important element in trust formation through computers (Feng, Lazar, & Preece, 2004), and is implicated as a key factor in a number of models of trust, such as buyer-seller trust (e.g., Doney & Canon, 1997) and leader-member trust (Linden, Wayne, & Stillwell, 1993). In the present study, liking towards the social networking profile is predicted to be influenced by fluency. This, in turn, should also play a role in decreasing or increasing trust (Burgoon et al., 2002). Participants are expected to apply feelings of liking towards trust of the person of the social networking profile.

H4a: *Profile processing fluency will be equated with target trustworthiness, such that targets will be perceived as less trustworthy under low fluency than high fluency processing.*

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H4b: *The effect of processing fluency on trust will be mediated by liking.*

Processing ease may also have effects on participants' disclosure to the person in the profile. Disclosure is important in relational development (Altman & Taylor, 1973) and is a key factor in increasing intimacy between partners (Reis & Shaver, 1988). In CMC, research indicates that people may disclose more than in face to face (Tidwell & Walther, 2002), and that these disclosures can in some cases be particularly impactful for building relationships online (Jiang, Bazarova, & Hancock, 2011). Given that people disclose to trusted others (Derlega, Metts, Petronio, & Margulis, 1993; Larzelere & Huston, 1980; Wheeless & Grotz, 1966), and that fluency affects interpersonal trust, the disclosure process may be enhanced or limited by fluency.

Disfluency stimulates feelings of unfamiliarity and risk (Alter & Oppenhimer, 2008b, Song & Schwarz, 2009). Across four studies, Alter & Oppenheimer (2009b) demonstrated that people disclose less when presented with a prompt presented in a hard to read font, and that this finding extends to behavior outside of laboratory manipulation. They found that this effect was connected to both feelings of risk (study 2) and negative emotion (study 3) associated with disfluency. The process of social penetration (e.g., getting to know a person) is comprised of a series of disclosures, categorizable as peripheral (e.g., biographical data), intermediate (e.g., attitudes, opinions), and core (e.g., personal beliefs, needs; Altman & Taylor, 1973). Disclosures that are deeper then peripheral are more intimate and help develop the relationship faster. More broadly, disclosure is linked to liking (Collins & Miller, 1994). We disclose to those that we like

as a means of growing the relationship. There is thus reason to believe that fluency should influence disclosure behavior, because it influences liking.

H5a: *Compared to high fluency processing, disclosure toward targets will be reduced in low fluency processing.*

H5b: *The effect of processing fluency on disclosure will be mediated by liking.*

Finally, there is significant evidence that fluency influences judgments of truth. For example, statements made by individuals speaking with an unfamiliar accent (introducing disfluency) are also judged as less true (Lev-Ari & Keycard, 2010) than semantically equivalent statements spoken in a familiar one. Phrases that rhyme seem more accurate (and thus true to reality) than semantically equivalent phrases that do not rhyme (McGlone & Tofighbakhsh, 2000), and information that is presented in an easy to read font following a hard to read font is also perceived as more true (e.g., Hansen et al., 2008; Reber & Schwarz, 1999). Perception of the social networking profile as more or less accurate should thus be influenced by how fluently it can be processed.

H6: *Profile processing fluency will be equated with deception perceptions, such that targets will be perceived as more deceptive under low fluency than high fluency processing.*

Chapter 3: Methods

PARTICIPANTS

A total of 198 participants were recruited for a study of "online profile evaluation" from undergraduate communication classes at a large Southwestern University. They were compensated for their participation with course extra credit and a chance to win a $10 gift card.

EXPERIMENTAL DESIGN

This study employed a simple one-way design with fluency context as a between-participants variable with four conditions (low fluency: low fluency popup, low fluency text; high fluency: high fluency text; and control: unmodified presentation). At the beginning of the sessions, participants were informed that they would evaluate a personal profile allegedly selected (but in truth entirely fabricated) from the social networking site Facebook. Four versions of the fictitious profile were created (see Appendix A). Participants were randomly assigned to profile versions.

Aside from the manipulations detailed in the following paragraphs, all other aspects of the stimulus profile were held constant. Across conditions, participants initially read a statement welcoming them to the study and asking them to read carefully and prepare to answer questions about the content of a profile presented subsequently (see Appendix A). Importantly, the welcome statement used language to suggest that the profile presented had been retyped by the experimenter. This disclaimer has been used in previous fluency studies (e.g., Oppenheimer, 2006) to ensure that participants do not use the font as a direct cue in forming an impression of the author. People do pay attention to

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typography and font choice when forming impressions (e.g., Lea & Spears, 1992), so it is necessary that the font be attributed solely to the experimenter to avoid confounding the relationship between processing fluency and impression formation. The profile and welcome statement were presented in Times New Roman, 12-point font, which was black (exceptions noted below) in a normal graphical window sufficiently large for the user to see the entire content of the profile without scrolling vertically or horizontally.

The profile was crafted to include descriptions of the author's demographic information, interests and hobbies, and core beliefs. In the profile, the author makes statements that allude to demographic information (e.g., "*Since graduating high school, I…"),* writes about interests (e.g., "*I follow popular culture but am also learning about music and arts*"), and talks about family relationships (e.g., "*I'm close with my siblings and I wouldn't have it any other way*"). As in other research on fluency and person perception (e.g., Zebrowitz, 2008), the gender of the profile author was not manipulated. One sentence in the profile referred to the author's gender: *"Just a small town girl who grew up with a loving family."*

In the control condition, presentation of the welcome statement and profile were unaltered from the format described above. The three other conditions in this study employed various alterations to the manner in which the welcome statement and profile were presented. In the low fluency popup condition, instead of viewing the profile on the webpage, participants instead clicked a link which activated a popup window to view the profile. The popup window in which the profile was shown was 180 pixels in height by

270 pixels in width. These dimensions were too small to display the entire profile, forcing participants to scroll both horizontally and vertically to read its content. The window dimensions were locked so that participants could not alter its size.

In the low fluency text and high fluency text conditions, a discrepant fluency technique was used to alter the manner in which the welcome statement and profile were presented. In this technique, a baseline level of fluency is first established, which contrasts with the fluency of a stimulus subsequently evaluated. For example, Hansen and colleagues (2008) preceded sentences in easy-to-read fonts with sentences in hard-to-read fonts to make the easy-to-read sentences seem even easier to read (see also Laham, Alter, & Goodwin, 2009; Shen et al., 2010). This strategy was employed in the present study by making either the welcome statement or the profile harder to read. If the welcome statement was harder to read, the profile would seem easier to read by comparison; if the welcome statement was easy to read, the profile would seem harder by comparison. Thus, in the high fluency text condition, the welcome statement was presented in a difficult to read light grey font (RGB: 219, 229, 255) used by Hansen and colleagues (2008), and the profile font was not altered. This made the profile comparatively easier to read. In the low fluency text condition, the welcome statement was unaltered but the profile was presented in light grey font, rendering the profile comparatively harder to read.

Demographics and Technology Usage.

Participants were asked several questions to gather demographic information and asses their familiarity with technology. Participants answered questions about their race, age, and biological sex. They were also asked about the frequency with which they use the internet in general and e-mail and social networking sites in particular (*How often do you use e-mail?*; *"How often do you use Facebook or other social networking sites?"*; *"How experienced are you with the internet?"*) on 7-point Likert-type scales.

Familiarity, Liking, Compatibility.

Participants' perceptions of the familiarity with and their liking for the profile author were each measured on a single item on a 7-point Likert-type scale (*How familiar does the person in the profile seem to you?; How much do you like the person in the profile?*). Friendship compatibility was assessed with the social dimension of McCroskey and McCain's (1974) Interpersonal Attraction Scale. This section of the scale is composed of 5 items measured on a 7-point Likert-type scale (see Appendix B).

Similarity.

Perceptions of the similarity between the profile author and the participant were measured using three items created by Moreland and Beach (1992). These items measured similarity by asking participants to "Imagine you are meeting and getting to know" the profile author and then rate on from 0-100 the likelihood that they would "B*e able to understand the author's personality pretty well*," "*Be able to understand the*

author's plans for the future are similar to your own," and "*Find out that the author came from the same social background as you*."

Trustworthiness Scales.

Perceptions of trustworthiness were measured with the interpersonal trust items taken from McCroskey and Young's (1981) credibility scale and Wheeless and Grotz's (1977) interpersonal trust scale. This scale is comprised of 7-point semantic differential items: *dishonest/honest, genuine/phony* (reverse coded)*, ethical/unethical* (reverse coded)*, inconsiderate/considerate, sensitive/ insensitive* (reverse coded)*, unfaithful/faithful, not understanding/understanding,* and *trustworthy /untrustworthy* (reverse coded), and has been shown to be reliable in previous research.

Disclosure.

Disclosure was measured in two ways. First, participants were given an open-ended prompt to respond to. This prompt asked participants to "*Tell the person in the profile some information that would help them get to know you better."* A minimum response of roughly four sentences was required before participants could continue on in the survey. The second way in which disclosure was measured was through the use of a shortened version of Wheeless' (1976) Revised Self-Disclosure Scale (Weiwei & Peiyi, 2011). Items on this scale measure self-perceptions of the amount, valence, depth, intentionality, and accuracy of self-disclosure. Participants were instructed to consider the statement they wrote in response to the prompt when completing this scale. This shortened scale is in Appendix C.

Profile Accuracy.

Perceptions of profile accuracy were measured with three items on a 7-point Likert-type scale, "*How much do you think this profile represents who the author is in real life?*", "*How much do you think the author of the profile embellished?*", and "*How deceptive is the information presented in this profile?*"

PROCEDURE

Participants were greeted upon arrival at the research space and shown to a computer terminal. The entirety of the study was delivered using an online survey platform, and participants were randomly assigned to conditions by the system when they accessed the survey. A total of 10 computer terminals were available, each equipped with identical Dell (Latitude D620) laptops. The screen dimensions were set to 900 pixels in height by 1440 in width, and screen brightness was set to maximum. Other aspects of the room that might influence the readability of the screen, such as lighting, were kept constant for the duration of the experiment. Before beginning participation, each participant was instructed to read and answer the survey carefully.

The online survey first displayed a consent form. After the participant agreed to participate and consented to move forward in the survey, the survey randomly assigned them to a condition and the next screen displayed the condition-appropriate welcome statement and subsequently the personal profile manipulation. Before moving on to the questionnaire part of the study, participants were asked to click a button labeled "*I have read the profile above.*" The rest of the survey contained the measures described earlier. At the end of the survey, participants were asked to report how difficult they found the

profile to read (a manipulation check), and also asked if/which aspects of the profile influenced their impression. They were also asked to write a brief statement conjecturing about the true purpose of the study. After completing this statement, participants were debriefed and asked not to discuss the study with their peers.

Chapter 4: Results

A total of 198 people participated in the study. Of these, two were excluded from subsequent analysis based on their responses during the debriefing. One indicated that she did not read the profile and another expressed suspicion that the profile was constructed by the experimenters. A third participant's responses were excluded based on the content of her responses to open-ended questions in the survey, the grammar of which indicated that she may not have understood English well enough to comprehend the survey materials. No other participants indicated that aspects of the experimental design (e.g., popup, font contrast) were factors in their judgment. The final sample was comprised of 195 participants (155 females) with an average age of 20.89 years ($SD = 3.26$). The majority of participants (91.3%) indicated that they considered themselves very experienced with the internet (5 or above on a 7-point scale). The large majority also indicated that they use Facebook or other social networking sites (87.2%) and email (94.9%) every day.

MANIPULATION CHECK

Participants' responses to an item gauging the difficulty they experienced while reading the profile constituted a manipulation check of processing fluency. The possible range on this item was 1-7, and participant responses ranged from 1-7. A one-way ANOVA revealed significant differences between conditions in perceived reading difficulty, $F(3, 191) = 56.4$, $p < .000$, $\eta^2 = .47$. Planned comparisons between condition means indicated that participants who read the high fluency text version of the profile condition ($M = 6.36$) and control version ($M = 6.58$) reported that the profile was easier

to read than others who read the low fluency text (M = 3.21) and low fluency popup (M = 4.71) versions. In addition, the low fluency popup condition was easier to read than the low fluency text condition (p's for all reported comparisons < .000). This pattern of results indicates that participants in the low fluency conditions found their profiles significantly harder to read than in the control, but the participants in the high fluency text condition did not report a difference.

LIKING AND FAMILIARITY

The first hypothesis predicted significant differences between fluency conditions on reported liking of the profile author. The possible range for the liking scale was 1-7, and the obtained range was also 1-7. A one-way ANOVA comparing the four experimental conditions on the liking variable was performed. The omnibus ANOVA was significant, $F(3, 191)$ = 5.09, p = .002, η^2 =.074. Planned pairwise comparisons revealed that, as predicted, participants in the high fluency text condition (M = 5.52) reported higher liking for the profile author than participants in the low fluency text (M = 4.72, p = .003), low fluency popup (M = 4.79, p = .002), or control (M = 4.76, p = .001) conditions. The comparison between the low fluency text condition and the control group was not significant (p = .9), nor was the comparison between the low fluency popup condition and the control group (p = .88). Table 1displays the means and standard deviations for each condition. Thus, general expectations regarding H1 were supported because the high fluency text condition had a significant positive effect of liking on the profile author.

Although no explicit prediction was made in the current study, Moreland and Zajonc (1982) reported evidence that fluency can influence impressions of the familiarity of an information source. Thus, ANOVA was completed to test for differences between fluency conditions on familiarity. The possible range for the familiarity scale was 1-7, and participant responses covered the full range. The results from this test did not indicate any significant differences, either in the omnibus ANOVA ($F(3, 191) = 1.26$, $p = .291$) or in post hoc comparisons.

SIMILARITY

Hypothesis 2a predicted that participants' perceptions of their similarity to the profile author would be influenced by processing fluency. Before exploring this hypothesis, two participants were excluded from the analysis based on their age (48 and 50 years). It was reasoned that general perceptions of similarity with the author of profile by these older participants may differ significantly from the rest of the sample simply by virtue of the apparent age disparity, and in particular the measure, "Be able to understand the author's plans for the future are similar to your own" may be problematic due to the perception of different ages. Reliability for the 3-item similarity scale was acceptable ($\alpha = .74$), and could not be improved by excluding items, so the items were formed into a composite. The possible range for responses on the composite similarity scale was 0-100, and participant responses ranged from 10-100.

A one-way ANOVA using a composite formed from the similarity scale as a dependent variable was significant, $F(3, 189) = 2.87$, $p = .038$, $\eta^2 = .044$. Planned

pairwise comparisons showed that, as predicted, perceived similarity to the profile author was significantly higher in the high fluency text condition ($M = 65.96$) than in either the low fluency popup ($M = 57.66$, $p = .039$) or control conditions ($M = 55.27$, $p = .007$). The low fluency text condition ($M = 61.89$) did not differ significantly from the high fluency text condition ($p = .31$), and neither the low fluency text condition ($p = .55$) nor the low fluency popup condition ($p = .097$) differed from the control condition. Table 1 presents these results. In sum, partial support for H2a was found.

Hypothesis 2b predicted that participants' reported liking of the profile author would mediate the relationship between processing fluency and participants' perceptions of their similarity to the author. To test the effects of liking on the relationship between fluency and similarity perceptions, a resampling mediation procedure (bootstrapping) recommended by Preacher and Hayes (2008; see also Shrout & Bolger, 2002) was used. Bootstrapping multiply resamples from the data, producing bias-corrected confidence intervals for the indirect effect in mediation analysis. Preacher and Hayes (2008) and others (e.g., MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) recommend this approach because it does not assume normality of the sampling distribution. This analysis also has an advantage over traditional univariate mediation tests because it includes all effects within a single model, thereby controlling for each mediator and reducing the chance of Type 1 error (Preacher & Hayes, 2008). The bootstrapping procedure also allows for comparison of categorical independent variables. An important feature of this approach is that it generates confidence intervals (set to 95% for the present study) for the indirect effects for each categorical level of a predictor variable.

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Thus, it allows for significance testing for the indirect effect for each level of the IV. In the present study, simple indicator coding was used with the control group set as the comparison variable (Hayes & Preacher, 2012).

The bootstrapping mediation analysis was conducted to test a model depicted in Figure 1 in which liking mediates the relationship between fluency and perceptions of similarity with the profile author. This analysis indicated that perceived liking was also a significant predictor of similarity perceptions, ($b = 8.15$, $t(185) = 7.85$, $p < .0000$). Inclusion of liking in the model, however, reduced the direct effect of fluency on similarity to non-significance ($p = .21$), and yielded a larger effect size ($\eta^2 = .28$) than when it was not included ($\eta^2 = .044$). Examination of the confidence intervals for each category of fluency indicated that only the high fluency text condition did not include 0, indicating that indirect effect of fluency on similarity through liking only for that condition (Preacher & Hayes, 2008). Broadly, these results support H2b and that liking explains much of the effect of processing fluency on similarity perceptions via liking. See Table 2 for estimated coefficients for all conditions.

COMPATIBILITY

Compatibility was measured using McCroskey and McCain's (1974) Interpersonal Attraction Scale. Items on this scale pertain principally to perceptions of friendship and interpersonal fit. In the current sample, this scale exhibited acceptable reliability ($\alpha = .77$) and thus was formed into a composite measure. The possible range for responses on the composite compatibility scale was 1-7, and participant responses

ranged from 2-7. Hypothesis 3a predicted that perceptions of compatibility would vary with profile fluency. The two aforementioned age outliers were again removed from the sample for calculations testing this hypothesis. A one-way ANOVA found significant differences between conditions, $F(3, 189) = 3.1$, $p = .028$, $\eta^2 = .047$. Planned comparisons showed that, as predicted, participants in the high fluency text condition perceived themselves as more compatible ($M = 5.72$) with the profile author than those in either the low fluency text ($M = 5.18$, $p = .007$), low fluency popup ($M = 5.25$, $p = .019$), and control ($M = 5.27$, $p = .024$) conditions. However, there were no significant differences in the planned comparisons between the control group and the low fluency text ($p = .9$) or low fluency popup conditions ($p = .64$). See Table 1 each conditions' mean and standard deviation. Taken as a whole, these results provide partial support for the prediction that processing fluency would influence participants' perceptions of compatibility with the profile author.

Hypothesis 3b predicted that the effect of fluency on compatibility would be mediated by similarity and liking. A multiple mediation model was conceived in which liking and similarity mediate the relationship between fluency and perceptions of compatibility with the profile author (see Figure 2). A bootstrapping-based multiple mediation analysis (Hayes & Preacher, 2012) indicated that both liking ($b = .49$, $t(184) = 10.76$, $p < .0000$) and similarity ($b = .01$, $t(184) = 3.91$, $p < .001$) were significant predictors of compatibility. When liking and similarity were included as mediators, the effect of processing fluency on perceived compatibility was reduced to non-significance ($p = .74$), indicating that a majority of the effect of fluency on compatibility is explained

by liking and similarity. This model also explained more of the variance than when liking and similarity were not included as mediators (from $\eta^2 = .047$ to $\eta^2 = .57$). See Table 3 for estimated coefficients for all conditions. In summary, the results provide strong support for H3b. Analysis of the 95% confidence intervals showed that the indirect effect for liking and for similarity were only significant via the high fluency text condition.

TRUST

Hypothesis 4a predicted that processing fluency would influence participants' trust of the profile author, such that the profile author in the high fluency condition would be trusted more than the author in the lower fluency condition. The semantic differentials comprising the trustworthiness scale exhibited high reliability in this sample ($\alpha = .89$) and thus were formed into a composite measure. The possible range for responses on the composite trustworthiness scale was 1-7, and participant responses ranged from 3.25-7. An omnibus ANOVA revealed that processing fluency significantly influenced perceived trust overall, $F(3, 191) = 2.79$, $p = .042$, $\eta^2 = .042$. Planned pairwise comparisons revealed that participants in the high fluency text condition reported significantly higher trust in the profile author ($M = 5.53$) than those in the low fluency text ($M = 5.01$, $p = .01$), low fluency popup ($M = 5.15$, $p = .034$), or control ($M = 5.15$, $p = .031$) conditions. However, there were no reliable differences in perceived trust between the low fluency text ($p = .98$) or low fluency popup ($p = .64$) and the control condition. Table 1features the means and standard deviations for each condition. Overall, the results provide partial support for

the prediction that processing fluency would influence participants' trust in the profile author.

Hypothesis 4b predicted that liking would mediate the effects of fluency on perceived trust. A model was conceived in which liking mediates the relationship between fluency and perceptions of trust with the profile author (see Figure 3). A bootstrapping-based mediation analysis indicated that liking was a significant predictor of trust ($b = .3$, $t(187) = 6.09$, $p < .0001$). Inclusion of liking in the equation explained more of the variance ($\eta^2 = .20$) than when it was not included ($\eta^2 = .042$), and reduced the direct effect of fluency on trust to non-significance ($p = .35$). These results are presented on Table 4. Analysis of confidence intervals showed that only for the high fluency text condition was the indirect effect through liking significant. Combined with the planned comparisons reported above, it can be concluded that high fluency text increases liking toward the profile, which in turn prompted higher trustworthiness ratings.

DISCLOSURE

Hypothesis 5a predicted an effect of fluency on disclosure. The present study employed two measures of disclosure: An open-ended question prompting participants to describe information they would disclose to the profile author in the service of getting to know her better, and a scale measure presented subsequently to gauge their perceived degree of disclosure in answering the open-ended question. The scale used was a shortened version of the Revised Self-Disclosure Scale (RSDS; Weiwei & Peiyi, 2011). This 12-item retrospective disclosure scale exhibited acceptable reliability in the current

sample (α = .75) and consequently the item responses were formed into a composite. The possible range for this composite was 1-7, and the reported range was 1.58-6.75. Using this composite as a dependent variable, an ANOVA assessing the influence of processing fluency on disclosure was conducted. This analysis did not reveal a significant effect of processing fluency, $F(3, 191) = .32$, $p = .82$, nor were any of the planned comparisons significant (all p's > .1). Consequently, the results did not show an effect of fluency on retrospective ratings perceived disclosure, as predicted by H5a. Table 1 has the means and standard deviations for this variable.

A second means through which self-disclosure was assessed was through analysis of participant responses to the writing prompt. Coders were asked to rate each sentence that participants wrote for the depth of disclosure, according to the categories (peripheral, intermediate, and core) proposed by Altman and Taylor (1973). These categories have also been used in other research studying disclosure in CMC (e.g., Tidwell & Walther, 2002). In the present study, sentences containing a peripheral disclosure (e.g., biographical data) were scored a one, those with intermediate disclosure (e.g., attitudes, opinions) were scored a two, and those featuring core disclosures (e.g., personal beliefs, needs) were scored a three. Each sentence was awarded a score according to the most revealing item disclosed. For example, "After attending the University of Texas for two years, I have broadened my horizons and have developed a deep desire to travel the world." would be coded as a core disclosure, because the second half reveals a core level of intimacy. Coders were instructed to ignore a sentence if it contained no disclosure. The scores for each sentence were summed to calculate a total disclosure score for each

participant. Some (n=11) participants were excluded because they apparently misinterpreted the prompt. Rather than disclosing about themselves, they instead wrote questions which they would ask the profile author to encourage her to disclose further. Inter-rater reliability was calculated for a subset of 49 cases (approximately ¼ of the total sample) using Krippendorff's Alpha for ratio measurements (Hayes & Krippendorff, 2007) and proved to be acceptable (α = .81).

To test the hypothesis that fluency would influence actual self-disclosure, a one-way ANOVA was conducted. Results from this test were not significant, $F(3, 184)$ = 1.05, p = .37 , nor were any of the planned comparisons significant (all p's > .1). H5a was therefore not supported. Table 1features the means and standard deviations for each condition. Mediation and indirect effect experts (e.g., Hayes, 2009) suggest that a non-significant total effect should not be grounds for termination of analysis if an indirect effect is expected, however. As such, a model specifying that liking would mediate the relationship between fluency and disclosure was created. The overall model was significant, $F(3, 179)$ = 3.05, p = .019, η^2 = .06. The confidence intervals revealed that the indirect effect of processing ease through liking was only significant in the high fluency text condition (b = .9; CI = .31, 1.95). A similar result was also found when using the participant's scores on the retrospective RSDS instead of their total disclosure scores. The overall equation was significant when liking was included, $F(3, 187)$ = 4, p = .0035, η^2 = .09. Again, confidence interval analysis suggests that liking was only a significant mediator in the high fluency text condition (b = .14; CI = .057, .26). Hypothesis 5b,

which predicted that liking would mediate the relationship between fluency and disclosure, was therefore partially supported.

DECEPTION

The ninth hypothesis predicted that fluency would be negatively related to perceptions of deceptiveness. The 3-item scale created to measure this proved to have poor reliability (α=.53), so MANOVA was conducted with each item as an individual dependent variable. The possible range for these items was 1-7, and participant responses ranged from 1-7 on each. The overall test was significant, $F(3, 191) = 2.49$, $p = .009$, η^2 =.038. Applying a Bonferroni correction set the level of statistical significance for subsequent tests at $p < .0166$. A significant effect was found for the item, "How much do you think the profile represents who the author is in real life?," $F(3, 191) = 3.71$, $p = .013$, η^2 =.055. Planned comparisons revealed that the high fluency text profile was seen as more representative ($M = 4.8$) than both the low fluency popup ($M = 4.08$, $p = .004$) and control conditions ($M = 4.26$, $p = .03$), but not different from the control condition ($M = 4.26$, $p = .63$). There were no differences between control and either the low fluency text condition (p = .094) or the low fluency popup condition (p =.478). Table 1features the means and standard deviations for each condition. The omnibus F for the items "How much do you think the author of the profile embellished?" ($F(3, 191) = 2.19$, $p = .092$) and "How deceptive is the information presented in the profile?" ($F(3, 191) = 2.119$, $p = .101$) were not significant. In sum, the sixth hypothesis was partially supported.

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Chapter 5: Discussion

The ease with which a stimulus can be processed – i.e., its "processing fluency" – can be misattributed to other stimulus qualities (e.g., Song & Schwarz, 2008). This dissertation constitutes the first study of processing fluency on person perception in a social networking profile context. Two manipulations designed to impair fluent processing of the profile information were used: one in which the profile was presented with a low font contrast to the background, and another in which the profile was displayed in a popup window that forced the reader to scroll horizontally and vertically to read it. A third manipulation used a commonly employed technique, discrepant fluency (e.g., Hansen et al., 2008), to make the experience of reading the profile seem more fluent than usual.

Broadly, it was expected that enhancing the processing ease participants experienced while reading a social networking profile would increase their liking for the profile author as well as perceptions of the author's trustworthiness, compatibility, and similarity to themselves; in contrast, decreasing processing ease was expected to exert an opposite effect on those same variables. These predictions derive from the social cognition research literature. A rationale based on the interpersonal communication literature was offered to support an additional prediction that fluency would influence disclosure and compatibility perceptions. Finally, derived principally from research showing that statements which are more difficult to process are frequently perceived as lower in accuracy (e.g., Lev-Ari & Keysar, 2010), it was also expected that the profile in the low fluency conditions would be viewed as more deceptive than in the other

conditions. Largely, these expectations were supported in the present study. However, an important qualifier is that significant effects were found only for manipulations designed to increase processing fluency; manipulations designed to decrease fluency (or in other words, increase disfluency) relative to a control condition were not successful. Discussed below are the findings for each of the hypotheses and suggestions regarding why disfluency effects were not detected.

FLUENCY EVALUATIONS

A principal finding in the processing fluency literature is that alterations in fluency generate affective information, which may be mistakenly attributed to other stimulus dimensions. At the most basic level, affect can be physiologically measured through monitoring muscle contraction (e.g., Harmon-Jones & Allen, 2001; Winkielman & Cacioppo, 2001), but it's frequently operationalized in fluency research as feelings of positivity or liking towards the stimulus (Reber et al., 1998). Effects of increased processing ease on liking have been documented on stimuli ranging from the simple (e.g., a symbol; Bornstein & D'Agostino, 1992) to the complex (e.g., a human face; Harmon-Jones & Allen, 2001).

In the present study, the first hypothesis predicted that liking would be influenced by the fluency with which the profile was presented. In concordance with this prediction, participants liked the author in the high-fluency profile more than in the other conditions. It is noteworthy that fluency was able to significantly increase liking despite the already generally high liking of the profile author (control condition liking: $M = 4.76$). The

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liking scale in the present study ranged from 1-7, so the effect of high fluency on liking may have actually been subject to a ceiling effect. Using a profile in future research which is manipulated to be less likeable may actually demonstrate an even stronger relationship between fluency and liking. The direct effect of fluency on liking has numerous implications for impression formation and thus relational development.

In interpersonal relationships, liking is often viewed as interwoven and interdependent with variables such as trust, disclosure, and friendship, and thus models of relationship development must account for the bidirectional influence of these factors on one another. For example, we disclose to those we like, but also like those we disclose to (Collins & Miller, 1994), and through these disclosures relationships develop intimacy (Altman & Taylor, 1973). Much evidence from laboratory (e.g., Lydon, Jamieson, & Zanna, 1988) and naturalistic (e.g., Byrne, Ervin, & Lamberth, 1970; Newcomb, 1961) settings suggest that people like unacquainted others to whom they are similar. This may be similarity in attitudes (e.g., Byrne, Bond, & Diamond, 1969) as well as activities (e.g., Jamieson, Lydon, & Zanna, 1987). Indeed, some theories propose that communicative strategies that increase similarity increase liking (e.g., communication accommodation theory; Giles, Coupland & Coupland, 1991). Given the abundance of evidence of bi-directional influence between liking and other interpersonal variables, it must first be clarified that the causal path is from processing ease to liking to other impressions.

There are reasons to expect that liking serves as a key mediator in the relationship between processing ease and the other dependent variables measured in this study. A

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primary reason stems from findings reported in the processing fluency literature, where the influence of processing ease on liking is well documented (e.g., Rhodes et al., 2001). Research on fluency also suggest that affective basis of judgment of liking appears to be the most proximal evaluation to initial processing of the stimulus (Winkielman, et al., 2006), so evaluation based on that element should precede all others.

Since visual processing ease was the key variable manipulated in the present study, it's reasonable to assume that the manipulation increased liking towards the author of the profile, which then secondarily influenced other judgments such as similarity and trust. Hypotheses two, three, and four predicted that the relationship between fluency similarity, compatibility, and trust would be mediated by liking. Evidence was found for a significant effect of processing fluency on these variables, with an indirect effect through liking accounting for much of the effect. Notably, mediation analysis provided evidence that the indirect effect was localized in the high fluency text condition. This condition was significantly different from the other conditions in pairwise comparisons, and on the basis of the mediation analysis this difference can be directly attributed to the effects of processing ease on liking.

Literatures addressing interpersonal evaluation and behavior (e.g., similarity, trust, compatibility, disclosure) provide further evidence suggesting that liking can be an important mediator. As described above, although the relationship between similarity and attraction is often conceptualized as similarity→ attraction, other evidence for an attraction→ similarity link exists. For example, people who were provided with a list of a

stranger's attributes (e.g., likability, morality, intelligence) expected the stranger to be more similar to them when attribute rankings were higher (Moss, Byrne, Baskett, & Sachs, 1975). In established friendships, satisfaction with the friendship predicts perception of similarity (Morry, 2003; 2007).

Balance theory (Heider, 1958) offers a potential explanation for the attraction-similarity link (e.g., Morry, 2003). In this account, people desire to remain consistent in their social relationships, and will attempt to correct imbalances though changing evaluations or sentiments. In this perspective, perception of similarity towards a liked other should be increased as a means of staying consistent. For the present study, above any base similarity the participants in the high fluency condition perceived with the profile author, the need to match their perceptions of similarity to their affective evaluation may have increased the level of their perceived similarity. Mere exposure accounts, which have largely been subsumed as processing fluency (Bornstein, 1989), also document that repeated exposures influence liking and similarity (Moreland & Zajonc, 1982; Moreland & Beach, 1990).

Support for hypotheses predicting that fluency would affect perceptions of compatibility and disclosure behavior was also found. Compatibility was measured with the social attraction portion of McCroskey and McCain's (1974) Interpersonal Attraction Scales. This dimension of interpersonal attraction is best represented as, "I think she could be a friend of mine" (McCroskey & McCain, 1974). Participants in the present study reported greater perceptions of friendship compatibility towards the profile author

in the high fluency text condition. Analysis also found that liking and similarity act as mediators for the relationship between fluency and compatibility, fitting with research on the role of liking and similarity in relationship formation (e.g., Byrne, 1971; Newcomb, 1961).

The high fluency text profile had an indirect effect on disclosure through enhancing liking, but that relationship was not strong enough to generate differences between groups. Although Collins and Miller's (1994) meta-analysis revealed a positive, reciprocal association between disclosure and liking, this effect can be ruled out in the present study because liking was measured before any disclosure task. However, the effect of fluency on disclosure appears to have operated through a mechanism different than the one proposed in other fluency/disclosure research. Alter and Oppenheimer (2009b) reported that participants disclosed less on a scale presented in a hard to read font, for reasons related to riskiness. However, in the present study an indirect effect of processing ease through liking was significant for the high fluency text condition. A key difference between these two studies is that Alter & Oppenheimer (2009b) manipulated the fluency of a scale, while the present study manipulated interpersonal perception. A processing fluency account of online relationship formation thus suggests that the processing ease of an online profile can be an important factor in determining how and the extent to which people decide to pursue relationships with online acquaintances.

A number of literatures dealing with trust between people in various contexts implicate liking as an important factor. For example, models of buyer-seller relationships

foreground liking as a critical factor in trust at the outset of a relationship (Swan, Trawick, & Silva, 1985) and as an influential factor throughout its duration (Nicholson, Compeau, & Sethi, 2001). At the outset of the employee-supervisor relationship, liking is a factor in perceptions of reliability between members of the dyad (Linden, Wayne, & Stillwell, 1993). Research on computer-mediated interactions demonstrates a correlation between liking and trust (Feng, Lazar, & Preece, 2004). More broadly, Johnson-George and Swap (1982) and other researchers (e.g., McAllister, 1995) differentiate between trust based on cognition and trust based on emotion or affect. Other models of trust include the trustor's determinations of the trustee's ability, integrity, and benevolence (Mayer, Davis, & Schoorman, 1995). Results from the present study suggest that fluency creates affectively-based trust by increasing liking. Enhancing interpersonal trust can only have positive effects (from the perspective of the trustee). Higher affective trust also influences the extent to which people rely on the other dimensions of trust such as competence (Casciaro & Lobo, 2008), suggesting that processing fluency is important for understanding trust formation in work groups.

Only weak support was found for the sixth hypothesis, which predicted that fluency would influence the perceived deceptiveness of the profile. The high fluency text profile was seen as more representative of the author than the low fluency popup and control conditions, suggesting that processing fluency may have some effect on these judgments. This finding fits with expectations that statements that are presented in a manner that enhances their processing ease are viewed more often as true (e.g., Reber & Schwarz, 1999). However, the low fluency text condition was also seen as more

representative of the author in "real life" than the low fluency popup condition, and was not significantly different from the high fluency text condition. Whether this can be attributed to an actual difference or unreliability in the scale is uncertain.

Research on online dating profiles demonstrates that people are aware of deceptive potential in online interactions (Donath, 1999) and often adopt tactics to increase perceptions of their veracity (Ellison et al., 2006). The present study provides some initial hints that fluency may be a route to enhance perceptions of truth in online profiles. Future research should test this more extensively, particularly in situations such as online dating, where a level of deception is commonplace (Toma, Hancock, & Ellison, 2008) and expected (Ellison et al., 2006).

FAMILIARITY

Familiarity may be a feeling of recognition of the stimulus (e.g., Jacoby & Dallas, 1971) or a sense that it is "old" rather than "new" (e.g., Claypool, Hall, Mackie, & Garcia-Marques, 2008). Other research has successfully demonstrated the effects of repeated exposure on familiarity (e.g., Moreland & Zajonc, 1982; Zebrowitz et al., 2008), but weak effects have also been reported (Moreland & Beach, 1990). As such, expectations for a connection between processing ease and increased feelings of familiarity in the present study were not high, and no such results were found. However, this should not be interpreted as a sign that the fluency manipulation did or did not create an experience of familiarity for participants, but rather as a sign that asking participants about perceptions of familiarity was imprecise at capturing any such impressions.

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Other research on fluency and interpersonal familiarity has primarily relied on repeated exposures to personal photos to enhance processing ease, so it may have been very easy for participants to decide not only whether the person was familiar but also what sense of familiarity was meant (e.g., *Have I seen the person in the photo before*?). In the present study, participants were asked to make a familiarity judgment based on a social networking site profile, introducing two levels of complexity into the judgment: determination of the basis on which familiarity should be judged, and deciding what is meant by familiarity (e.g., *Does this remind me of someone* versus *Do I recognize this profile*?). As such, the null effect of fluency on familiarity in the present study was probably an artifact of the instrument used and the inherent ambiguity of deciding whether the profile author is "familiar" or not.

LOW FLUENCY

In the present study, participants in two conditions read a profile that was expected to be harder to process than the control condition, but neither of the conditions differed significantly from the control or one another on the outcome variables. This was somewhat surprising, because there is theoretical support for the expectation that disfluent processing would influence person perception. For example, Sansom-Daly and Forgas (2012) report that trait (e.g., *coldness, niceness*) ratings of a person featured in a blurred photo were more negative overall than when the same photo was presented without a blur. In other work, judgments of an author's intelligence were lower when the writing was adjusted to be harder to process (Oppenheimer, 2006). Three possibilities

exist why the low fluency conditions did not show significant differences from the control conditions.

One possibility is that the manipulation was simply unsuccessful. However, this does not seem to be the case since participants in both the low fluency text and low fluency popup condition reported that the profile was harder to read than the control. Additionally, the low fluency text condition was significantly harder to read than the low fluency popup condition. Other fluency research has also asked participants outright to report on the difficulty they had reading or understanding a stimulus (e.g., Oppenheimer, 2006). It is difficult to justify a conclusion that participants did not experience more difficulty with either of the low fluency conditions.

A second consideration is that perhaps the low fluency manipulations were too heavy-handed. An alternate interpretation of the ease of reading results discussed in the previous paragraph is that participants in the low fluency conditions were cognizant of the source of their difficulty reading and thus did not misattribute effects to the stimulus. Recall that, for fluency to affect judgment, there must not be an immediate, obvious source for it (Schwarz, 2004). For example, Shen and colleagues (2010) drew participants' attention to the poor room lighting and eliminated the effect of hard to read text on judgment. Other work has reported a boomerang effect when participants are able to make obvious inferences about the source of low fluency and thus adjust for it in their evaluations (Oppenheimer, 2006).

In the present study, perhaps participants were able to directly attribute their difficulty to the format that the profile was presented in, which would explain the lack of difference between the low fluency manipulations and the control. Auxiliary support for this belief is that participants in the high fluency condition did not report a significant difference in ease of reading compared to the control condition. However, this may have also been due to a ceiling effect, since both the high fluency and control conditions reached a mean of above 6 points on the "ease of reading" scale.

An alternative account that must be considered is that participants' expectancies regarding encountering an online profile may have encouraged them to discount the disfluency information. Whittlesea (2004) reports several studies in which expectations regarding ease of processing must be violated for fluency to alter judgments. In the present study, participants may have expected that a novel personal profile would be difficult and unfamiliar and, as a result their expectancies in the low fluency conditions were not violated. On the other hand, in the high fluency condition participants may have been surprised by the unusual ease of processing, fulfilling the necessary expectancy violation theorized by Whittlesea (2004) and creating a discrepant processing experience.

GENERAL DISCUSSION

The results of the present study suggest that processing fluency phenomena can operate in people's appraisals of social-networking profiles. A number of fluency researchers have called for greater attention to the role of processing fluency in judgment of complex stimuli (e.g., Winkielman et al., 2003). Fluency effects are expected to be

strongest on judgment when there is little information available regarding the stimulus. As the amount of information about the stimulus increases, either due to higher complexity (and thus more sources of information; Winkielman et al., 2003) or amount of time allowed to examine the stimulus (Bornstein & D'Agonstino, 1992), the effects of fluency are expected to decrease. Although the present study afforded participants time to carefully read and evaluate a profile, itself constituting a complex stimulus, the effect of processing fluency on judgment was demonstrated.

This dissertation demonstrated a multi-step process through which processing fluency is able to influence interpersonal evaluations. First, liking towards the person in the profile is increased through misattribution of processing ease. In the second step, liking is applied to complex, multidimensional judgments such as trust and friendship. A third stage of this process, which should be explored more fully in future work, is the application of evaluations of interpersonal judgments such as trust or compatibility to relational outcomes. For example, one can imagine that the effects of processing fluency on trust may lead to the selection of one online dating profile over another, all other things being equal.

There are numerous ways in which fluency might be enhanced or impaired in computer-mediated interactions. As with the manipulations in the present study, processing ease may be impaired through use of difficult to read font. Personal photos might be pixilated, or bandwidth limitations on video connections can result in video communication that is grainy or blurred. Interface designs may also be sources of

disfluency. Similar to the popup window used in the present study, users of the popular Android operating system for mobile device sometimes face interfaces that are not optimized for their screen size and thus display information in a disfluent manner (Bonnington, 2012). There are also numerous opportunities for online interactants to encounter stimuli that have enhanced fluency, as well. Familiar layouts, interfaces, or particularly clean presentation of information may all encourage fluent processing. In addition, computer users may encounter discrepant fluency, similar to the contrast used in the high fluency text manipulation in the present study. As they click through online dating profiles or switch between competing retailers' websites, the contrast between the previous and current level of fluency they experience will create effects on their judgment.

Results from the present study suggest that the role of processing ease in computer-based impression formation bears further attention. Participants in the present study were asked to evaluate the disclosures of another person by viewing their personal profile. As expected, evaluation of the content was influenced by the fluency with which the information was presented. Although users exert careful control and consideration of the way they present themselves online (Ellison et al., 2006; Walther, 1996), results from the present study suggest that aspects external to this effort can interfere with impression formation efforts.

According to Social Information Processing Theory (SIPT; Walther, 1992), CMC users can, over time, develop to levels of liking and trust similar to face to face partners.

This theory was proposed to counter the prevailing expectation that CMC interactions were task focused and unrecoverably limited in relational cues (see Walther, 2011). When given the opportunity to overcome the limitations of communicating through computers, interactants are able to develop relationships similar to or even exceeding those in face to face relationships (Walther & Burgoon, 1992; Walther, 1996). Processing fluency appears to offer a jump-start to the relational development process. Liking, trust, and similarity perceptions are all increased, and more meaningful disclosure may also occur.

The role of processing fluency in online relationship formation can be important in several ways. First, prominent theories of impression development in CMC acknowledge that there is a tendency for users to base impressions of one another on information that is often scant (Lea & Spears, 1992; Walther, 1996). This overattribution process leads to the formation of more intense impressions (Hancock & Dunham, 2001), even though they may be based on less information. As a result, impressions that are influenced by processing ease may be skewed further by overattribution. However, this effect might be attenuated as information about the target accrues, either through interaction or a richer profile. There is a large gradient of information people might possess about one another in unacquainted interactions (Anonymous, 1998), variability which may enhance or attenuate the effect of fluency. In initial interactions, or interactions in which very little is known about the interaction partner, fluency effects should be particularly influential. This expectation should be explicitly tested in future work on fluency and online impression formation.

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Judgments of trust are important online, where deception is expected in many contexts (Donath, 1999; Ellison et al., 2006). The costs (time, money) for approaching a new relationship partner are arguably lower than face to face relationships, so in the absence of trust people may move on to their next best option rather than persist in a risky relationship. As online users attempt to assess one another's honesty and trustworthiness, the role of fluency is important to understand. Future research should include realistic scenarios to continue to explore the effects of fluency on trust behavior online. It should also look at the effects of fluency within both anonymous and identifiable situations online.

Computer-mediated interactions are often found to feature more disclosure than equivalent face to face interactions (e.g., Joinson, 2001; Parks & Floyd, 1996). In CMC, disclosure is purposive with the intention of growing the relationship (Gibbs, Ellison, & Heino, 2006). The lack of nonverbal cues in some computer-mediated interactions make disclosure particularly important as a means of relationship development and uncertainty reduction (Tidwell & Walther, 2002). Results from the present study provide limited support that processing ease can enhance disclosure. This is likely to encourage a deeper, more intimate relationship, although some qualifications to the nature of disclosures exist (Gibbs et al., 2006). Generally, online, as in face to face, disclosure is a central part of the relationship formation process.

There is also some need to consider fluency effects, particularly the low fluency popup manipulation, in light of interactivity principles in computer-mediated interactions.

Use of a hyperlink to activate popup window introduces a moderate level of interactivity to the interface, which in previous research has been shown to improve liking as well as retention of stimulus information (Sundar, Kalyanaraman, & Brown, 2003). At least in the present study, the effect of interactivity in improving liking which was reported by Sundar and colleagues (2003) was not detected, as the popup condition did not significantly differ on reported liking from the control. Sundar and Kim (2005) propose that greater interactivity increases involvement with and attention to the stimulus materials, discouraging heuristic processing. Researchers have reported that disfluency can engage a more analytic, careful processing style (Alter, Oppenheimer, Eply, & Eyre, 2007), and how this might function with interactivity is unknown. Future work studying processing fluency may want to take interactivity into account when designing materials. Particularly, investigating whether disfluency may suppress interactivity and whether fluency and interactivity effects are cumulative are of worth.

LIMITATIONS AND FUTURE DIRECTIONS

This study has demonstrated that information on processing ease can be misattributed during the evaluation of online profiles. However, there are several areas in which this research can be improved. A primary consideration is using a less obtrusive means of impairing the fluent processing of the profile. Results from the present study suggest that computer-mediated communication users may expect and easily attribute difficult processing to the source of perceptual disfluency (e.g., small popup window, hard to read font). Participants may have been too aware of the manipulations in the low fluency conditions. People engaging in computer-mediated communication or

information seeking may be used to encountering poorly designed (in terms of readability) personal profiles and ill-fitting pop-ups, so attribution of processing difficulty to those factors may have been much easier. Although they did not indicate that the text contrast or size of the popup window were factors in their judgment of the profile author, there is reason to expect that if the difficulty with the profile was too salient, it might counter the fluency phenomenon (Shen et al., 2010). Thus, a more subtle manipulation is needed for researchers wishing to establish a reliable means of manipulating disfluent processing of a personal profile. Future work may want to test the threshold for disfluency effects in an online context.

The core effect of fluency on liking and familiarity is not expected to differ with a disfluently presented profile, but the valence of the effect should be negative rather than positive. Ancillary evidence that disfluently presented information lowers judgments of the putative author is demonstrated in research on apology (Merola, Blackburn, & McGlone, submitted). This study contrasted a disfluently presented apology with a control apology, and found evaluations of the author of the disfluently presented apology were lower on several dimensions than with the control apology. However, it is methodologically important to establish a reliable manipulation of disfluency on personal profile evaluations.

Some leads toward this goal may be found in research investigating fluency and processing expectations. Fluency information may exert the most influence on judgment when it is juxtaposed against differing expectations regarding the stimulus. For example,

people who are in a negative mood experience larger effects of fluency on positive reaction and liking (De Vries et al., 2010; Harmon-Jones & Allen, 2001). When the processing of a stimulus is different from what is expected, stronger effects of fluency on judgment may occur (Whittlesea & Williams, 1998; Whittlesea & Williams, 2001). This underlies the use of discrepant fluency manipulations (Hansen et al., 2008; Reber & Schwarz, 1999) and the high fluency text manipulation in the present study, in which a feeling of relative ease in processing the stimulus of interest is achieved by preceding it with a lower fluency stimulus. A study may wish to use such a manipulation to demonstrate the effects of disfluent processing on impression formation.

Future work should also explore the interaction between gender and fluency on the person perception variables explored in this study. Previous work on fluency has almost always held gender constant (e.g., Harmon-Jones & Allen, 2001; Moreland & Beach, 1992; Sansom-Daly & Forgas, 2012). As researchers work to extend processing fluency to theories of impression formation and relational development, important questions may arise regarding the naïve theories which males and females apply. Although the evaluative effect of fluency on liking (or, presumably, familiarity) should not differ across the gender composition of dyads (Zebrowitz et al., 2008), there may be differences in the application of this information to subsequent judgments. For instance, males and females use group membership and relationship-based cues differently when determining trust (Maddux & Brewer, 2005). Information regarding the likability or familiarity of the interaction partner might thus be applied differently in male-male, male-female, or female-female relationships.

Another limitation of this study is the inability to test for fluency interactions with gender due to a low male sample. No other fluency researchers have reported finding gender differences in the effect of fluency. In addition to the possible differences in how fluency information is interpreted while forming impressions between same- and cross-gender dyads, there may also be differences between genders in how the impressions formed influence outcome behavior. CMC users are aware of risks to their personal safety and adjust their behavior according to these risks (Gibbs, Ellison, & Lai, 2011). A reasonable assumption is that females may rely more on feelings of trust (and thus safety) when deciding whether to take an online relationship offline. As such, there is the possibility for gender differences not only in how fluency information is applied to judgments but also in the subsequent weight of those judgments in behavior, and this needs to be tested within the framework of a larger model of processing fluency and online relational development.

CONCLUSIONS

The goal of this dissertation was to adapt the literature on processing fluency to interpersonal evaluations in a computer-mediated communication scenario. Results from this study show that liking of an individual encountered in a social networking environment was enhanced by the ease with which his/her profile could be processed, which then acted as a primary influence on judgments such as trust, similarity, and compatibility. A simple manipulation of font contrast was demonstrated to strengthen newly forming bonds of liking, trust, and other interpersonal variables between interaction partners. Although artificially enhanced affinity may be benign in many cases,

and can even offer a means through which relationships can develop more quickly, there may also be negative outcomes from this accelerated trust. Hasty decisions to trust others online may lead to risky behavior or poor decisions. As such, care must be taken when creating and viewing online profiles.

This dissertation demonstrates that factors outside of the control of a social networking profile author can play a role in influencing the impressions which other people form. Namely, the ease with which the profile is cognitively processed can influence judgments such as liking, similarity, and trustworthiness. These judgments formed key factors in determining who we form relationships with and how those relationships develop. This work is important in light of the central role of computer-mediated interaction in modern friendship, love, and commerce. The subtle yet substantial influence of processing fluency on interpersonal judgment demonstrated in this dissertation shows an area of inquiry that deserves further investigation.

Table 1: Means and Standard Deviations for All Conditions on All Dependent Variables

Variable	Condition			
	Low-Popup	Low-Text	Control	High-Text
Liking	4.79(1.35)	4.72(1.02)	4.76(1.45)	5.52(.84)
Similarity	57.66(21.1)	61.89(19.13)	55.27(22.17)	65.95(14.82)
Compatibility	5.25(1.12)	5.18(.88)	5.27(1.09)	5.72(.77)
Trust	5.15(.99)	5.06(.81)	5.15(.84)	5.53(.84)
Disclosure Scale	14.36(8.18)	12.33(5.61)	14.15(5.84)	13.39(5.29)
Disclosure Writing	4.88(.87)	4.9(.73)	5.0(.55)	4.87(.91)
Representativeness	4.08(1.38)	4.68(1.07)	4.26(1.35)	4.8(1.09)

Note. *SD*s in parenthesis

Table 2: Mediation Estimates for Fluency on Similarity with
Liking as Mediator

Variable	b	se	p
Fluency to liking			
Constant	4.76	.17	--
Low Fluency Popup	-0.037	.24	0.88
Low Fluency Text	0.032	.24	0.77
High Fluency Text	0.76	.24	0.0015
Direct effect of mediator on similarity			
Liking	8.15	1.04	0.0001
Total effect of condition on similarity			
Constant	55.27	2.76	--
Low Fluency Popup	61.89	3.96	0.1
Low Fluency Text	57.66	3.96	0.55
High Fluency Text	65.96	3.92	0.007
Remaining Direct effect			
Constant	16.46	5.49	--
Low Fluency Popup	6.92	3.45	0.05
Low Fluency Text	1.82	3.45	0.6
High Fluency Text	4.40	3.51	0.22

	b	CIlower	CIupper	p
Indirect effects (bootstrap results)				
Liking				
Total indirect effect	0.48	0.065	0.97	0.05
Low Fluency Popup	-.3	-4.09	3.8	n.s.
Low Fluency Text	0.57	-4.0	5.32	n.s.
High Fluency Text	6.28	2.57	11.03	0.05

Table 3: Multiple Mediation Estimates for Fluency on Compatibility with Liking and Similarity as Mediators

Variable	b	se	p	
Fluency to liking				
Constant	4.76	.17	--	
Low Fluency Popup	-0.037	.24	0.88	
Low Fluency Text	0.032	.24	0.77	
High Fluency Text	0.76	.24	0.0015	
Fluency to similarity				
Constant	55.27	2.76	--	
Low Fluency Popup	6.62	3.96	0.1	
Low Fluency Text	2.39	3.96	0.55	
High Fluency Text	10.69	3.92	0.007	
Direct effect of mediators on compatibility				
Liking	0.5	0.046	0.0001	
Similarity	0.011	0.0028	0.0001	
Total effect of condition on compatibility				
Constant	5.27	0.14	--	
Low Fluency Popup	-0.093	0.20	0.64	
Low Fluency Text	-0.025	0.20	0.9	
High Fluency Text	0.45	0.20	0.02	
Remaining Direct effect				
Constant	2.29	0.22	--	
Low Fluency Popup	-14.8	0.14	0.05	
Low Fluency Text	-0.086	0.13	0.6	
High Fluency Text	-0.055	0.14	0.22	
	b	CIlower	CIupper	p
Indirect effects (bootstrap results)				
Liking				
Total indirect effect	0.03	0.002	0.06	0.05
Low Fluency Popup	-.018	-0.26	0.24	n.s.
Low Fluency Text	0.035	-0.25	0.31	n.s.
High Fluency Text	0.39	0.17	0.65	0.05
Similarity				
Total indirect effect	0.0003	-.0001	0.001	n.s.
Low Fluency Popup	0.07	-0.0083	0.2	n.s.
Low Fluency Text	0.026	-0.064	0.14	n.s.
High Fluency Text	0.12	0.034	0.26	0.05

Table 4: Mediation Estimates for Fluency on Trust with
Liking Mediating

Variable	b	se	p
Fluency to liking			
Constant	4.76	.17	--
Low Fluency Popup	-0.037	.24	0.88
Low Fluency Text	0.032	.24	0.9
High Fluency Text	0.76	.24	0.0017
Direct effect of mediator on trust			
Liking	0.3	0.049	0.0001
Total effect of condition on trust			
Constant	5.14	0.12	--
Low Fluency Popup	-0.084	0.18	0.64
Low Fluency Text	0.0035	0.18	0.98
High Fluency Text	0.38	0.17	0.031
Remaining Direct effect			
Constant	3.74	0.26	--
Low Fluency Popup	0.07	0.16	0.65
Low Fluency Text	-0.0058	0.16	0.97
High Fluency Text	0.16	0.16	0.35

	b	CIlower	CIupper	p
Indirect effects (bootstrap results)				
Liking				
Total indirect effect	0.018	0.0019	0.035	0.05
Low Fluency Popup	-.011	-.17	0.14	*n.s.*
Low Fluency Text	0.009	-.16	0.18	*n.s.*
High Fluency Text	0.23	0.096	0.4	0.05

Figure 1: Screenshot of manipulation in control condition

qualtrics.com

Please read the following profile carefully. We're interested in your evaluations of the person who wrote it. We took it from their Facebook profile and retyped it.

Try to form an impression of the person as you read it. You'll be asked questions about them later. Please read carefully, you'll also be asked a few memory questions about the profile.

Just a girl from a small town. I like to jog and read. I'm into movies (any kind - comedy, drama, or action). I'd love to travel a bit more than I have. There are parts of the USA I haven't seen, not to mention Europe and Asia. I've got the rest of my life to do that.

My friends consider me to be friendly, nice, romantic, athletic, and an open communicator. I grew up with a loving family. I'm close with my siblings and I wouldn't have it any other way. Since graduating high school I've tried to expand my friend group and pick up some new interests. Of course, I follow popular culture but am also learning about music and arts. Overall, my motto is probably, 'Just be yourself, there is someone out there who will appreciate you, for you.'

I have read the profile above
○ Ok

Figure 2: Screenshot of manipulation in low fluency text condition

qualtrics.com®

Please read the following profile carefully. We're interested in your evaluations of the person who wrote it. We took it from their Facebook profile and retyped it.

Try to form an impression of the person as you read it. You'll be asked questions about them later. Please read carefully, you'll also be asked a few memory questions about the profile.

Just a girl from a small town. I like to jog and read. I'm into movies (any kind - comedy, drama, or action). I'd love to travel a bit more than I have. There are parts of the USA I haven't seen, not to mention Europe and Asia. I've got the rest of my life to do that.

My friends consider me to be friendly, nice, romantic, athletic, and an open communicator. I grew up with a loving family. I'm close with my siblings and I wouldn't have it any other way. Since graduating high school I've tried to expand my friend group and pick up some new interests. Of course, I follow popular culture but am also learning about music and arts. Overall, my motto is probably, 'Just be yourself, there is someone out there who will appreciate you, for you.'

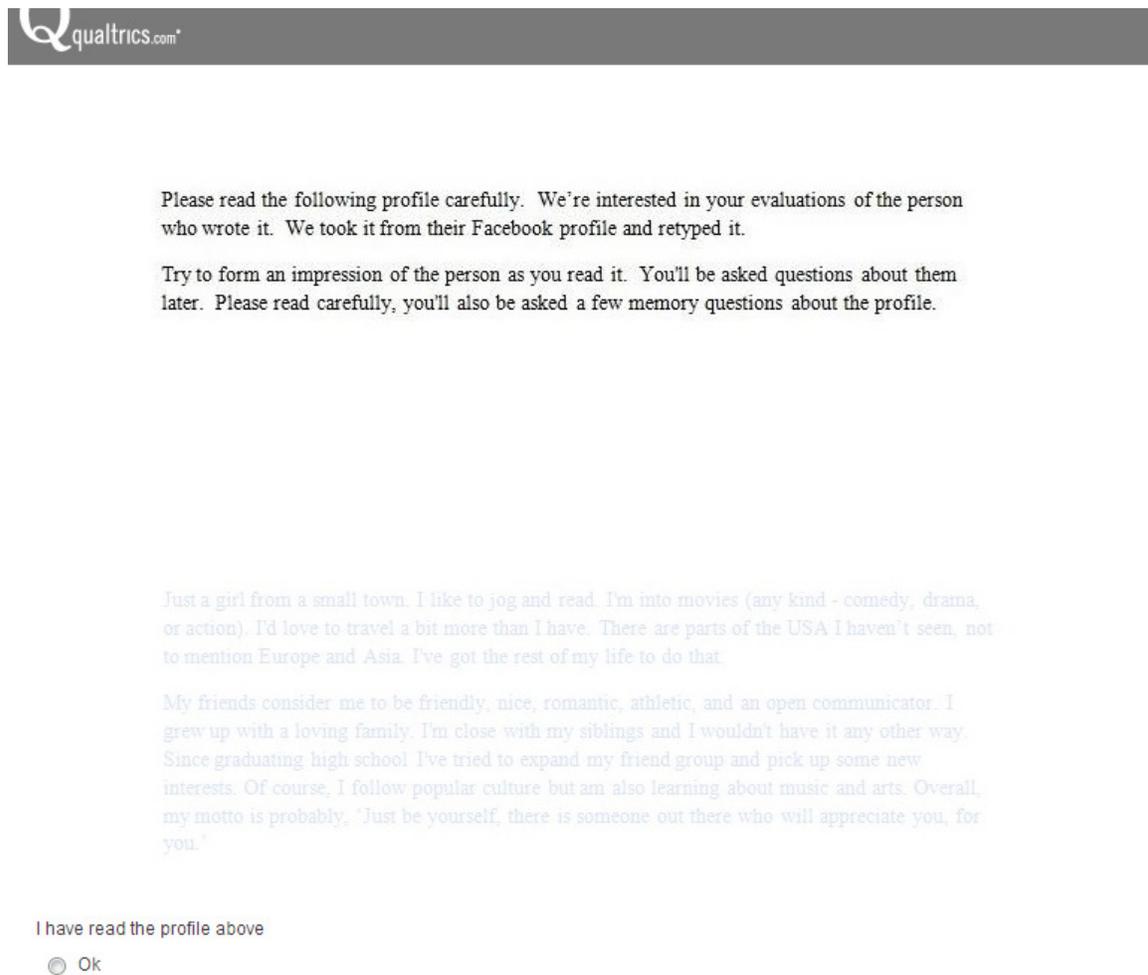I have read the profile above

○ Ok

69

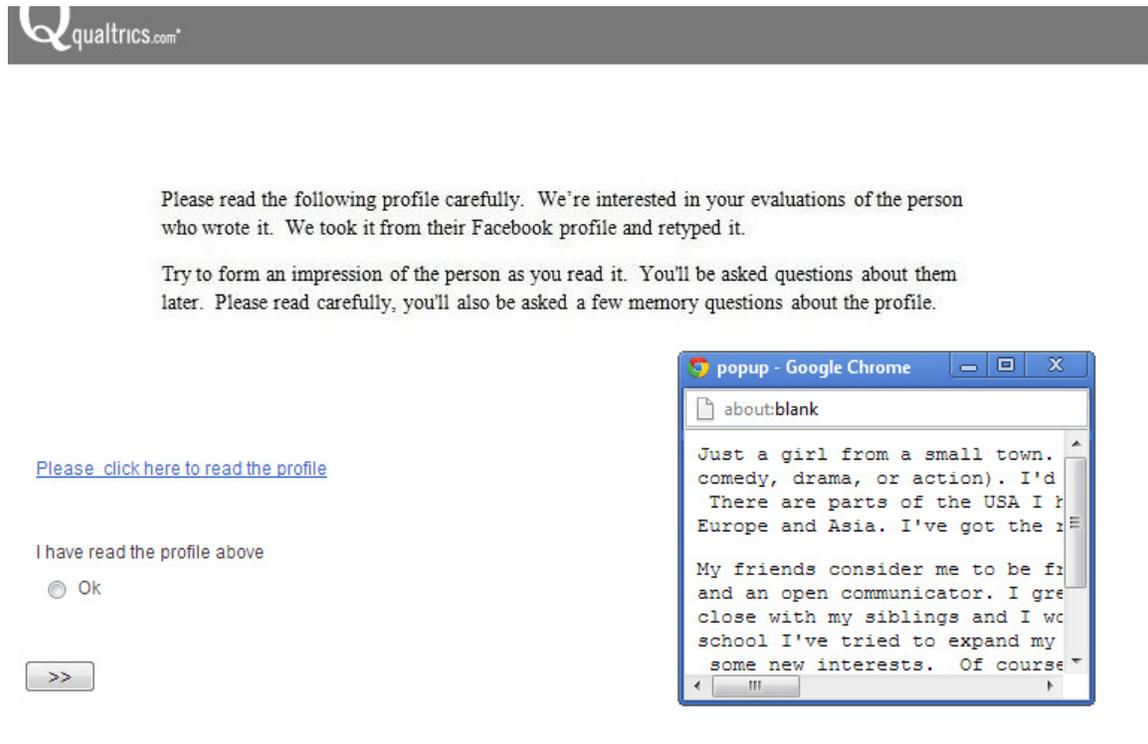Figure 3: Screenshot of manipulation in low fluency popup condition

Figure 4. Screenshot of manipulation in high fluency text condition

Please read the following profile carefully. We're interested in your evaluations of the person who wrote it. We took it from their Facebook profile and retyped it.

Try to form an impression of the person as you read it. You'll be asked questions about them later. Please read carefully, you'll also be asked a few memory questions about the profile.

Just a girl from a small town. I like to jog and read. I'm into movies (any kind - comedy, drama, or action). I'd love to travel a bit more than I have. There are parts of the USA I haven't seen, not to mention Europe and Asia. I've got the rest of my life to do that.

My friends consider me to be friendly, nice, romantic, athletic, and an open communicator. I grew up with a loving family. I'm close with my siblings and I wouldn't have it any other way. Since graduating high school I've tried to expand my friend group and pick up some new interests. Of course, I follow popular culture but am also learning about music and arts. Overall, my motto is probably, 'Just be yourself, there is someone out there who will appreciate you, for you.'
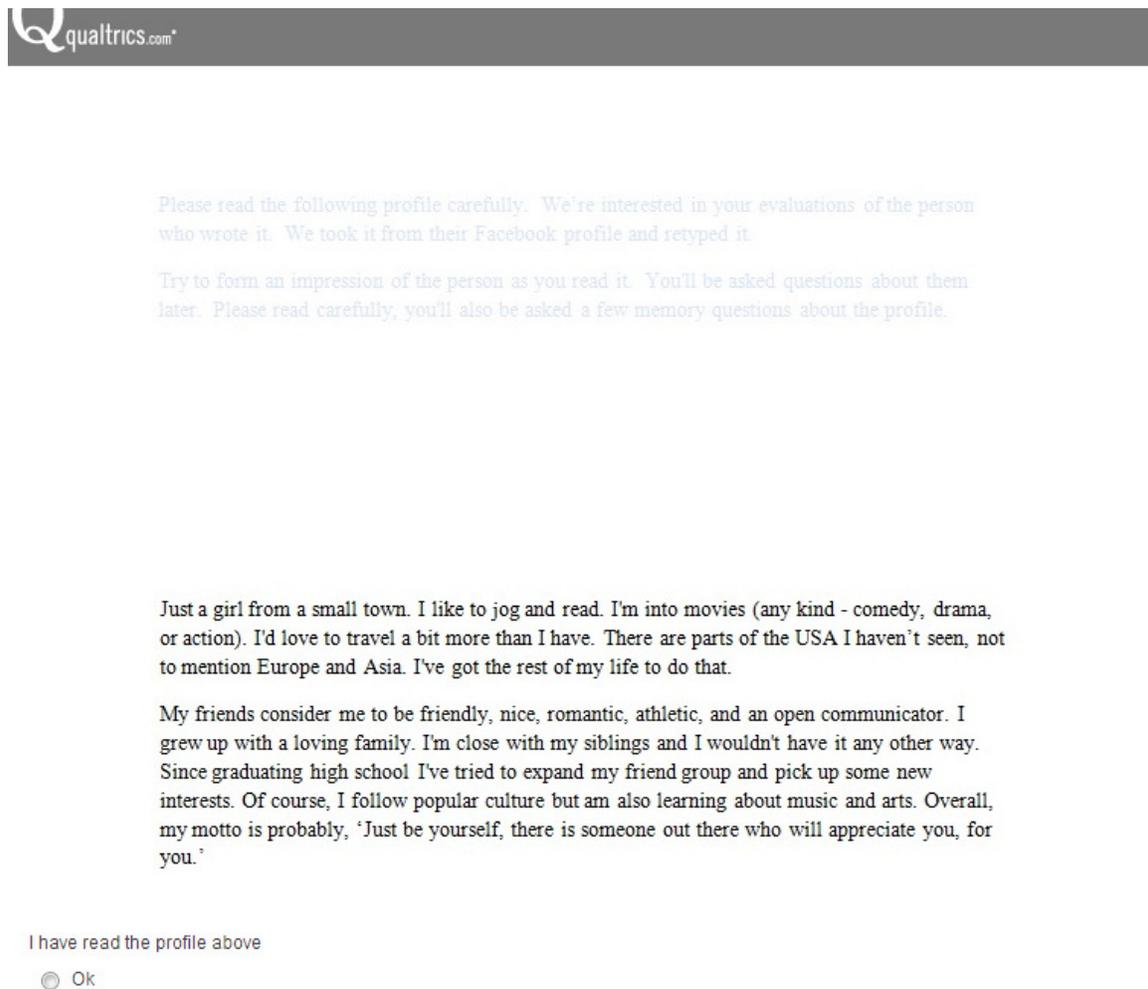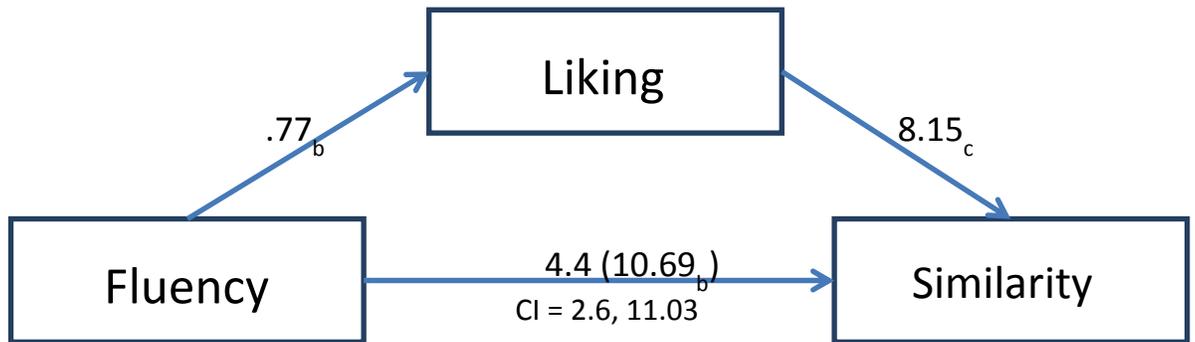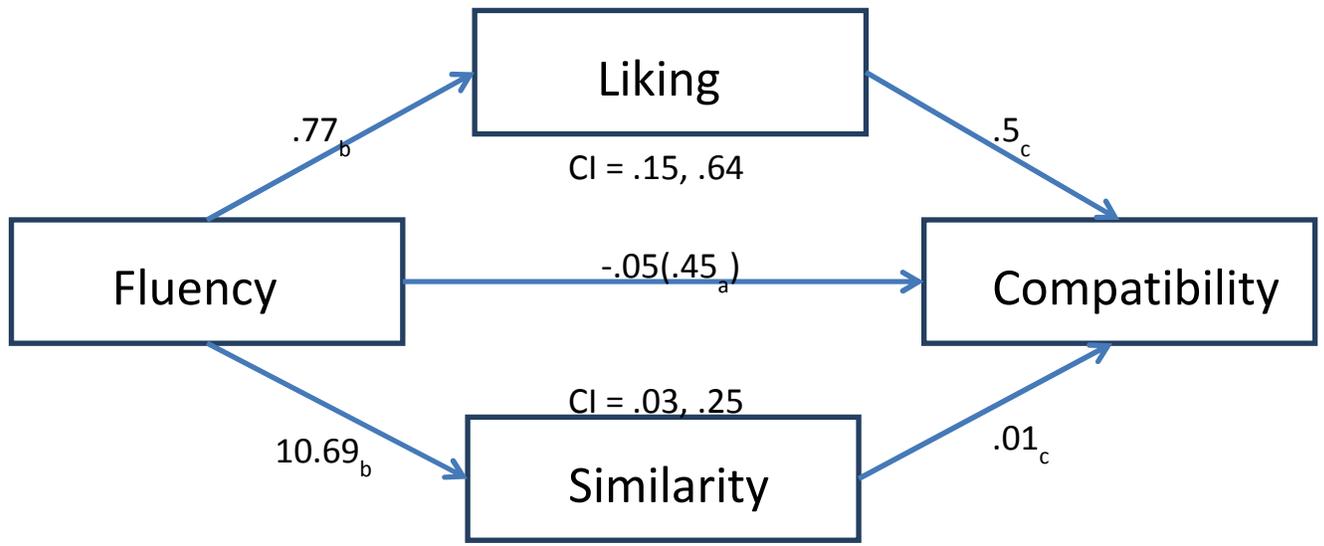
I have read the profile above

◎ Ok

71

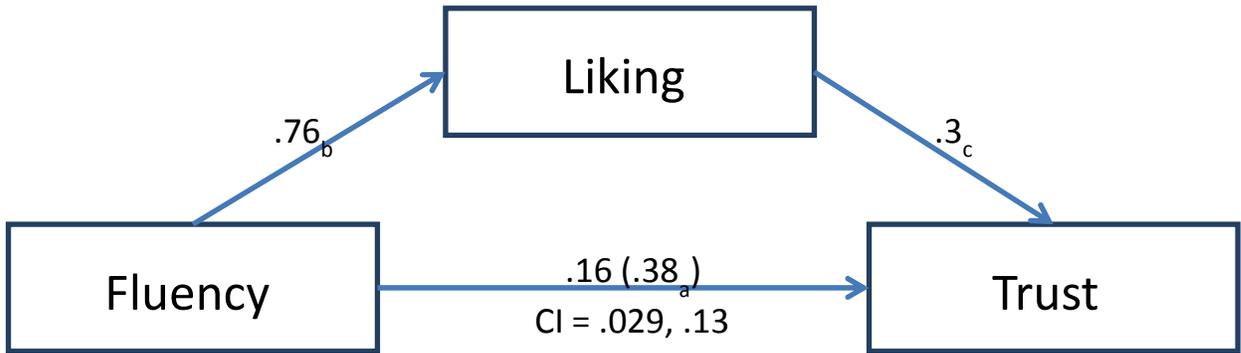Figure 5: Mediating role of liking in the relationship between high fluency and similarity

Note. Total effect in parentheses. CI that does not include 0 indicates statistically significant mediation at $p < .05$. Subscript: a = $p < .05$, b = $p < .01$, c = $p < .001$

Figure 6: Mediating roles of liking and similarity in the relationship between high

fluency and compatibility

Note. Total effect in parentheses. CI that does not include 0 indicates statistically significant mediation at *p* < .05. Subscript: a = *p* <.05, b = *p* < .01, c = *p* <.001

Figure 7: Mediating role of liking in the relationship between high fluency and trust

Note. Total effect in parentheses. CI that does not include 0 indicates statistically significant mediation at $p < .05$. Subscript: a = $p < .05$, b = $p < .01$, c = $p < .001$

APPENDICES

Appendix A: Statement and Profile Materials

Statement to precede profile:

> *Please read the following profile carefully. We're interested in your evaluations of the person who wrote it. We took it from their Facebook profile and retyped it.*

> *Try to form an impression of the person who wrote it. You'll be asked questions about them later. Please read carefully, you'll also be asked a few memory questions about the profile.*

Profile:

> *Just a small town girl who grew up with a loving family. I like to jog and read. I'm into movies (any kind - comedy, drama, or action). I'd love to travel a bit more than I have. There are parts of the USA I haven't seen, not to mention Europe and Asia. I've got the rest of my life to do that.*
> *My friends consider me to be friendly, nice, romantic, athletic, and an open communicator. I'm close with my siblings and I wouldn't have it any other way. Since graduating high school I've tried to expand my friend group and pick up some new interests. Of course, I follow popular culture but am also learning about music and arts. Overall, my motto is probably, 'Just be yourself, there is someone out there who will appreciate you, for you.'*

Appendix B: McCroskey and McCain's (1974) Social Attraction Scale

___I think he (she) could be a friend of mine.

___It would be difficult to meet and talk with him (her).

___He (she) just wouldn't fit into my circle of friends.

___We could never establish a personal friendship with each other.

___I would like to have a friendly chat with him (her).

Appendix C: Revised Self-Disclosure Scale

Valence
1. I didn't disclose negative things about myself in the message.
2. I revealed more desirable things about myself than undesirable things.
3. On the whole, my disclosures about myself in the message were more positive than negative.

Depth
4. Once I got started, I intimately and fully revealed myself in the message.
5. I disclosed intimate, personal things about myself without hesitation.
6. I feel that I sometimes did not control my self-disclosure of personal or intimate things.

Amount
7. I wrote a lot about myself.
8. My message didn't reveal many details about myself.

Intentionality
9. When I expressed my feelings in my message, I was always aware of what I was writing.
10. I was consciously aware of what I was revealing/disclosing

Honesty-Accuracy
11. I was always honest in my self-disclosures in the message.
12. My statements about my feelings, emotions, and experiences in the message were accurate self-perceptions.

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