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Research Article

Suppressing Secrecy Through Metacognitive Ease

Cognitive Fluency Encourages Self-Disclosure

Adam L. Alter¹ and Daniel M. Oppenheimer²

¹New York University and ²Princeton University

ABSTRACT—*Understanding when people reveal unfavorable information about themselves is both practically and theoretically important. Existing research suggests that people tend not to adopt stable disclosure strategies, and consequently disclose too much information in some situations (e.g., embarrassing personal information on Facebook) and too little in other situations (e.g., risky sexual behavior to a physician during diagnosis of a possible sexually transmitted disease). We sought to identify a domain-general cue that predicts self-disclosure patterns. We found that metacognitive ease, or fluency, promoted greater disclosure, both in tightly controlled lab studies (Studies 1a, 1b, and 3) and in an ecologically valid on-line field study (Study 4). Disfluency tended to prime thoughts and emotions associated with risk, which might be one reason why people who experience disfluency are less comfortable with self-disclosure (Studies 2 and 3). We conclude by discussing the implications of these results for theory and clinical practice.*

Self-disclosure, “making the self known to others” (Jourard & Lasakow, 1958, p. 91), fosters interpersonal trust (Ensari & Miller, 2002; Turner, Hewstone, & Voci, 2007), dampens anxiety following trauma (e.g., Greenberg & Stone, 1992a, 1992b; Pennebaker, Kiecolt-Glaser, & Glaser, 1988), enhances the quality of social relationships (e.g., Collins & Miller, 1994), and often improves negotiation outcomes (e.g., Fisher, Ury, & Patton, 1991). Despite these benefits, self-disclosure is also inherently risky. People cannot reveal themselves to others without first trading the protection of privacy for enhanced scrutiny and potential criticism (e.g., Jourard, 1971). Indeed, resistance to disclosure is so strong that a majority of high-risk HIV patients

fail to disclose enough information to their doctors to facilitate accurate diagnoses (Epstein et al., 1998). Self-disclosure also poses modern financial risks associated with identity theft, privacy breaches, and Internet fraud (Whitty & Joinson, 2009).

Previous research has shown that people do not have stable disclosure strategies, and base their decision of whether or not to disclose information on transient environmental cues (John, Acquisti, & Loewenstein, 2009). Much of the work on disclosure elicitation has focused on how people respond to specific trust-based cues. For example, studies have shown that people are more likely to disclose information when the venue they are in seems private (Joinson & Paine, 2007), if their interaction partner has established a record of trustworthiness (Andrade, Kaltcheva, & Weitz, 2002), if prevailing laws effectively encourage disclosure (Galletly & Pinkerton, 2006), and if the costs of disclosure are relatively low (Paine, Joinson, Buchanan, & Reips, 2006). Although these cues seem useful in identifying safe settings, people also respond to cues that are potentially misleading. The same questionnaire administered on-line rather than in paper-and-pencil format tends to elicit more honesty and disclosure, and less socially desirable responding (Tourangeau, 2004). People are similarly more inclined to divulge information using e-mail or on-line instant messages, or while blogging, than when they communicate face-to-face (e.g., Harper & Harper, 2006; Whitty & Joinson, 2009). These findings are important because they suggest that people are particularly willing to self-disclose in potentially dangerous settings—those that contain numerous anonymous viewers whose motives are difficult to ascertain.

Although the literature describes specific social and situational factors that lead to disclosure, little work has explored the domain-general cognitive factors that lead people to divulge information. One potential candidate is *fluency*—the metacognitive experience of ease or difficulty associated with processing information. Fluency is a ubiquitous metacognitive cue; all cognitive tasks vary by how easy it is to process the relevant information (e.g., stimuli can be difficult to perceive, spaces can

Address correspondence to Adam L. Alter, Marketing Department, Stern School of Business, Tisch Hall, 40 West 4th St., New York, NY 10012, e-mail: aalter@stern.nyu.edu.

be difficult to navigate, text can be difficult to process linguistically), and people therefore have access to fluency cues when making decisions across a broad range of situations (for a review, see Alter & Oppenheimer, 2009). Indeed, fluency influences a vast array of cognitive processes, including truth assessment (e.g., McGlone & Tofiqbakhsh, 2000), stock purchasing decisions (Alter & Oppenheimer, 2006), currency valuation (Alter & Oppenheimer, 2008a), appraisal of psychological distance (Alter & Oppenheimer, 2008b), and judgments of confidence (e.g., Simmons & Nelson, 2006).

Although researchers have not yet examined the effects of fluency on self-disclosure, there are good reasons to expect that disfluency discourages self-disclosure. Considerable evidence suggests, for example, that disfluency functions as an alarm that signals the need for greater scrutiny and deliberation before acting (Alter, Oppenheimer, Epley, & Eyre, 2007). Moreover, recent research has shown that people consider stimuli that are processed disfluently to be riskier than stimuli that are processed fluently (Song & Schwarz, 2009), which suggests that people should engage in less self-disclosure in disfluent contexts than in fluent contexts.

Because of the ubiquity of fluency as a metacognitive cue, understanding how fluency influences self-disclosure is critical. This understanding will allow policymakers, researchers, and legislators to engineer situations that effectively discourage or encourage disclosure. The current studies extend the theoretical focus of fluency research from cognitive processing to an interpersonal, social-psychological domain. We conducted three lab studies and one on-line field study to examine the effect of fluency on self-disclosure, and to determine whether this effect might emerge in part because disfluency prompts thoughts and emotions associated with risk and concern.

STUDY 1A: ADMITTING FLAWS, PART I

In the first study, participants completed a social-desirability scale, which measured their willingness to disclose socially undesirable thoughts and behaviors. To examine the effects of fluency on self-disclosure, we presented the scale to participants in either a clear font or a difficult-to-read font.

Method

Participants

Thirty-three Princeton University undergraduates (mean age = 20.70 years, $SD = 2.83$; 23 females, 10 males; 67% White, 15% Asian, 9% Black, 9% Hispanic) volunteered to complete a short questionnaire while seated in the university campus center.

Procedure, Materials, and Design

Participants completed one of two versions of Crowne and Marlowe's (1960) Social Desirability Scale (SDS). One version was printed in a clear font (12-point Times New Roman font:

sample), and the other was printed in a difficult-to-read font (50% gray, italicized 10-point Times New Roman font: *sample*). The two questionnaires were otherwise identical.

The 33-item SDS assesses how strongly people claim 18 virtuous but implausible attributes (e.g., "No matter who I'm talking to, I'm always a good listener") and deny 15 common human frailties (e.g., "I like to gossip at times"). Lower scores on the scale indicate a willingness to disclose potentially self-incriminating flaws.

To rule out the possibility that the difficult-to-read font induced frustration and therefore changed how participants responded to the SDS, we asked participants to indicate how frustrated they were (from 1, *not at all frustrated*, to 7, *very frustrated*) after completing the scale.

Results and Discussion

Participants tended to choose a greater percentage of socially desirable, nondisclosing responses when the SDS was printed in the difficult-to-read font (disfluent condition: $M = 40.83\%$, $SD = 22.93$) than when it was printed in the clear font (fluent condition: $M = 34.94\%$, $SD = 19.17$), $t(32) = 2.26$, $p = .03$, $p_{rep} = .91$, $\eta_p^2 = .14$. Moreover, participants who reported greater frustration did not disclose significantly less information about themselves, $r(31) = -.18$, $p > .3$, $p_{rep} < .6$; this result suggests that participants in the disfluent condition were not less likely to self-disclose merely because they were more frustrated than those in the fluent condition.

STUDY 1B: ADMITTING FLAWS, PART II

Method

To ensure that the results in Study 1a were replicable and generalized beyond one specific psychometric instrument, we conducted a second study, in which a separate sample of participants completed a 10-item version of the SDS (Strahan & Gerbasi, 1972). Thirty-six participants (mean age = 23.00 years, $SD = 3.58$; 20 females, 16 males; 47% White, 36% Asian, 3% Hispanic, 14% other ethnicities) completed the questionnaire in the university campus center. Fluency was manipulated using the same method as in Study 1a.

Results and Discussion

As in Study 1a, participants provided a higher percentage of socially desirable responses when the SDS was printed in the difficult-to-read font ($M = 42.11\%$, $SD = 21.20$) than when it was printed in the clear font ($M = 34.71\%$, $SD = 20.27$), $t(9) = 2.57$, $p = .03$, $p_{rep} = .91$, $\eta_p^2 = .42$. Again, participants who reported greater frustration did not disclose significantly less information about themselves, $r(34) = -.02$, $p > .9$, $p_{rep} < .19$.

STUDY 2: DISFLUENCY AND THOUGHTS OF RISK

Studies 1a and 1b suggested that people are less willing to disclose potentially damaging information about themselves when they experience disfluency. One likely explanation for this effect is that people tend to experience diminished confidence and greater vigilance when they experience disfluency (e.g., Alter et al., 2007), which might temper their willingness to disclose self-incriminating attributes. In other words, disfluency might heighten awareness of the risks and downsides of divulging negative information. Alternatively, the unease engendered by disfluency might lead participants to more strongly desire social support, in turn leading them to exhibit greater self-presentational caution when asked to disclose information about themselves. To discriminate between these mechanisms, we had participants in Study 2 perform a word-stem completion task that included a mixture of words associated with risk and words associated with self-presentational concerns.

Method

Participants

Sixty-seven adult participants (mean age = 38.07 years, $SD = 10.99$; 45 females, 22 males; 87% White, 7% Asian, 1% Black, 4% other ethnicities) completed an on-line word-stem completion task. Each participant signed up using an on-line platform hosted by Amazon.com and completed the study in exchange for a small gift certificate.

Materials, Design, and Procedure

Participants provided the missing letter from each of 16 word stems “in order to create the first English word that popped into [their heads].” Eight of the stems could be completed to form words associated with risk (e.g., “ris_” could be completed to form “risk” or “rise”), 5 could form words associated with self-presentational concerns (e.g., “_iked” could be made to form “liked” or “hiked”), and the remainder were filler stems that formed words associated with neither concept (e.g., “_og” could be made to form “dog”). The fillers served as distractors and lowered the possibility that participants would guess our hypothesis. The words associated with risk and self-presentational concerns were chosen because they were the words most commonly associated with each construct in a small, informal pilot study.

We manipulated fluency between participants, using the font manipulation described for Study 1. Accordingly, the entire study appeared on the computer screen in the clear font for half the participants and in the difficult-to-read font for the other half.

Results and Discussion

Participants’ word-stem completion responses were scored on a binary scale based on whether or not they formed the relevant

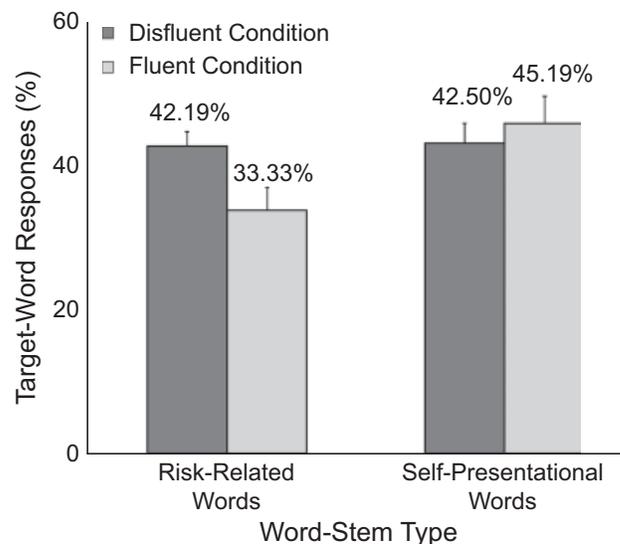


Fig. 1. Percentage of target responses in the fluent and disfluent conditions in Study 2 as a function of word-stem type. Each word stem could be completed to form either a target word (i.e., a risk-related word or a word related to self-presentational concerns) or a neutral word. Error bars represent standard errors of the mean.

target word. For example, a response of “liked” for the stem “_iked” was scored with 1, whereas a response of “hiked” was scored with 0. From this set of scores, we calculated the proportion of self-presentational and risk-related word stems that participants completed to form a target word.

On the resulting proportions, we performed a 2 (fluency: fluent, disfluent) \times 2 (word-stem type: risk, self-presentational) mixed-design analysis of variance (ANOVA), with repeated measures on the second factor. There was a significant Fluency \times Word-Stem Type interaction, $F(1, 65) = 4.19, p < .05, p_{rep} = .88, \eta_p^2 = .06$ (see Fig. 1). Simple-effects analyses showed that participants responded with risk-related words more frequently in the disfluent condition than in the fluent condition, $F(1, 65) = 6.31, p < .02, p_{rep} = .93, \eta_p^2 = .09$, whereas their likelihood of responding with self-presentational words did not differ by fluency condition, $F < 1$. Cognitive disfluency therefore heightened participants’ tendency to generate thoughts associated with risk, but not thoughts associated with self-presentational concerns.

STUDY 3: DISCLOSURE OF OPINIONS

Studies 1 and 2 established that people disclose less information when they experience disfluency than when they experience fluency, and that disfluency arouses cognitions associated with risk and unease. In Study 3, we sought to show more directly that heightened unease accounts for the relationship between disfluency and self-disclosure. Participants completed a self-disclosure questionnaire in which they rated how comfortable they would be discussing their views on 30 self-relevant issues. The questionnaire was presented either in the clear font or in the

difficult-to-read font described in Study 1. Participants also indicated how apprehensive they felt on a 15-item emotions measure. We expected that participants in the disfluent condition would be less willing to disclose their views than participants in the fluent condition, and that this relationship would be mediated by participants' heightened experience of apprehension in the disfluent condition.

Method

Participants

Seventy-four adult participants (mean age = 32.80 years, $SD = 10.68$; 52 females, 22 males; 74% White, 11% Asian, 5% Black, 9% other ethnicities) completed an on-line questionnaire using the Amazon.com platform described in Study 2.

Materials, Design, and Procedure

Participants completed one of two questionnaires, which were identical except for the font in which they were presented. We used the same fonts as in Studies 1 and 2.

In the first part of the questionnaire, participants indicated how comfortable they would be (from 1, *very uncomfortable*, to 7, *very comfortable*) to disclose their views on 30 self-relevant issues with a stranger whom they would never meet again. We selected the 30 most pertinent contemporary issues from the 60 issues in Jourard and Lasakow's (1958) original scale. For example, we retained issues such as "What I think about religion" and "The kinds of things that make me furious," but discarded issues such as "My views on communism" and "My views on the question of racial integration in schools." The 30 retained issues are listed in the Supporting Information available on-line (see p. 1420).

After completing the scale, participants rated how strongly (from 1, *not at all*, to 7, *very*) they felt 15 discomfort-related emotions—exposed, uncomfortable, uneasy, embarrassed, both-

ered, anxious, tense, sad, worried, unhappy, exposed, distressed, agitated, relaxed (reverse-coded), and calm (reverse-coded). Most of these dimensions were adopted from the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), and the remaining items were included to more acutely measure risk-related concern. Responses to these items were highly related to each other ($\alpha = .94$), so we averaged them to form a single discomfort index.

Finally, participants provided fluency ratings, indicating how easily they could read the text in a sentence written in the same font they had encountered on the questionnaire (from 1, *very difficult*, to 7, *very easy*).

Results

Primary Results

As expected, participants rated the clear font easier to read ($M = 6.70$, $SD = 0.56$) than the difficult-to-read font ($M = 5.52$, $SD = 1.48$), $t(72) = 4.79$, $p < 10^{-6}$, $p_{rep} > .99$, $\eta_p^2 = .24$. Moreover, as in Studies 1 and 2, the questionnaire items tended to elicit greater disclosure in the fluent condition ($M = 5.78$, $SD = 0.69$) than in the disfluent condition ($M = 5.63$, $SD = 0.57$), $t(29) = 2.82$, $p < .01$, $p_{rep} = .95$, $\eta_p^2 = .22$.

Mediation Analysis

Adopting the procedure popularized by Baron and Kenny (1986), we tested whether the relationship between disfluency and diminished self-disclosure was mediated by participants' heightened experience of negative emotions in the disfluent condition. As Figure 2 shows, participants who found the font harder to read expressed greater discomfort and exhibited a diminished willingness to disclose their opinions on the 30 topics. However, this relationship between fluency and self-disclosure was mediated by the experience of negative emotions, Sobel's $z = 2.01$, $p < .05$, $p_{rep} = .88$. Study 3 therefore suggests

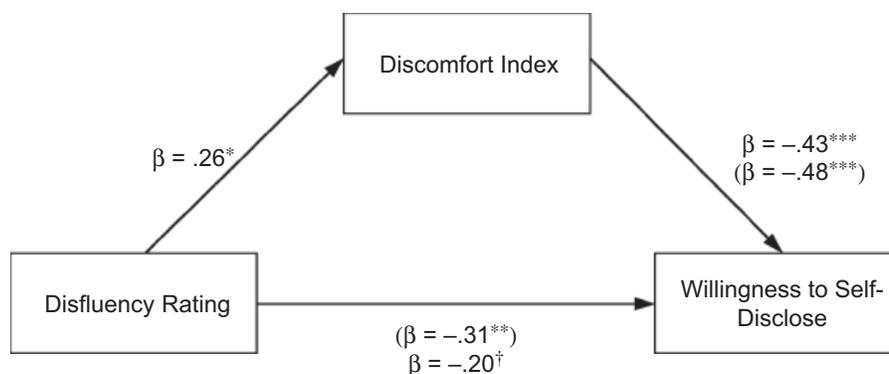


Fig. 2. Discomfort as a mediator in the relationship between disfluency and self-disclosure in Study 3. Betas in parentheses represent the strength of direct or simple relationships between the variables; betas outside parentheses represent the strength of the relationships between two variables when the other variable in the model is controlled. Significance of the coefficients is indicated, $†p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

that at least part of the reason why people prefer not to disclose self-relevant information when they experience disfluency is that disfluency enhances discomfort.

STUDY 4: GROUHPUG CONFESSIONS

Although the previous studies established that people avoided disclosing their flaws when they experienced cognitive disfluency, the studies were run in an artificial laboratory setting. Despite the methodological rigor afforded by laboratory studies, they lack the ecological validity of more naturalistic settings. To illustrate the practical importance of our earlier results in the real world, we took advantage of a serendipitous change in the formatting of an on-line confessions site. Grouphug (<http://www.grouphug.us>) is an anonymous on-line community in which people disclose personal secrets to other readers, who correspondingly issue virtual hugs. In August 2008, the site's creator elected to change the site's background from black to white, which rendered the site substantially easier to read. To extend the results from our lab studies, we examined whether users' confessions disclosed more information when the site adopted its new, easier-to-read format.

Method

Confessions

With the permission of Grouphug's creator, we acquired 450 anonymous confessions that were either logged within the 2 weeks before the site was reformatted (*disfluent confessions*) or within the 2 weeks after the site was reformatted (*fluent confessions*). The confessions were randomly selected from a much larger pool of several thousand that were logged during the target 4-week period. Of the 450 entries, 426 were usable. The remaining 24 entries either were blank entries or failed to include a confession (e.g., racial hate speech without a specific target). Noting that the unusable entries were equally split between the fluent and disfluent conditions, we excluded them from the remaining analyses.

Fluency Conditions

In its original format, the Grouphug Web site displayed confessions written in gray against a black background. The site's Webmaster recognized that the confessions were difficult to read, and reformatted the site in August 2008 so that the confessions were written in black against a light background. (A sample confession presented in both formats is included in the Supporting Information available on-line; see p. 1420.) Apart from the format change, the Web site remained the same. A short pilot test confirmed the Webmaster's assessment: All 10 participants agreed that the site was more difficult to read in its original format. We therefore categorized confessions made before the change as made in the disfluent condition, and those made after the change as made in the fluent condition. We se-

lected confessions that were made immediately before and after the change to match as closely as possible the timing of the confessions made in the two conditions.

Disclosure Ratings

One hundred participants volunteered to rate the confessions, signing up using the same Amazon.com platform described in Study 2. Each participant received one of nine separate sets of 50 confessions. Participants rated how embarrassed they would have been to disclose the information in each confession (from 1, *not at all*, to 7, *very*), and each confession was ultimately rated by approximately 10 participants.

Results and Discussion

Results were consistent with our previous findings: Confessors tended to disclose more embarrassing information in the fluent condition ($M = 3.24$, $SD = 1.10$) than in the disfluent condition ($M = 3.01$, $SD = 0.90$), $F(1, 424) = 4.65$, $p < .04$, $p_{rep} = .90$, $\eta_p^2 = .01$.

One potential concern with this finding is that confessors may have merely responded differently because the site's format changed, rather than because they experienced its enhanced fluency per se. To address this possibility, we examined the relationship between the embarrassment scores in the fluent condition and how long after the format change the confessions were made. Because the confessions did not disclose decreasingly less information over the 2 weeks following the site's reformatting, $r(221) = -.01$, $p > .94$, we were confident that confessors were not merely responding to the change in the site's format. Study 4 therefore replicated the findings of the earlier studies, suggesting that people are more willing to disclose information about themselves when they experience cognitive fluency.

GENERAL DISCUSSION

Across four studies, people self-disclosed less in the face of cognitive disfluency than in the face of cognitive fluency. In three tightly controlled lab studies, disfluency led participants to hide their flaws (Studies 1a, 1b, and 3), and to think more readily about risk and concern (Studies 2 and 3). In an on-line field study (Study 4), people disclosed more revealing information about themselves on a confession-based Web site when the site was formatted fluently rather than disfluently.

These findings add to the growing body of literature showing that fluency influences judgments as varied as liking (e.g., Reber, Winkielman, & Schwarz, 1998), valuation (e.g., Alter & Oppenheimer, 2006, 2008a), and distance estimates (e.g., Alter & Oppenheimer, 2008b). The domain-general nature of the fluency construct renders these results quite useful across a broad array of domains. For example, clinical psychologists, social workers, physicians, and other helping professionals might elicit self-disclosure from clients more readily if they

enhance the fluency of interaction. Because fluency cues take many guises (e.g., linguistic cues, visual cues, auditory cues; Alter & Oppenheimer, 2009), practitioners have many opportunities to induce fluency—for example, by selecting simple words rather than long-winded alternatives (cf. Oppenheimer, 2006). Evidence from the negotiation literature similarly suggests that mutual disclosure benefits both negotiating parties, enabling them to identify their otherwise opaque mutual interests (e.g., Fisher et al., 1991). On the other end of the spectrum, given the rise of the Internet and the proliferation of privacy-violating crimes like identity theft, Internet-security programs might strategically include disfluency to deter people from too readily disclosing private information.

Our results also suggest potential improvements for psychometric instruments and survey studies. Many clinical and personality inventories are undermined when respondents bow to social-desirability concerns. For example, the popular Minnesota Multiphasic Personality Inventory includes the L scale, a series of questions designed to identify which subjects are faking answers in socially desirable ways so that the data from those participants can be excluded from consideration (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989). Similarly, the bogus-pipeline manipulation (Jones & Sigall, 1971) is a classic paradigm in social psychology designed to encourage honesty. Given the importance of eliciting self-disclosure in many contexts, physicians, Web designers, and health care practitioners might benefit from fluency-based interventions.

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