Dr. Wilkowski: Article 2009-0127 (z2g - 3593) is available for download

---

Journal of Personality and Social Psychology Published by American Psychological Association

Dear Author,

The page proof of your article (# 2009-0127), which has been accepted for publication in Journal of Personality and Social Psychology, is now ready for your final review. To access your proof, please refer to this URL:

http://rapidproof.cadmus.com/RapidProof/retrieval/index.jsp

Login: your e-mail address
Password: 889hDw39FH6B

The site contains one file. You will need to have Adobe Acrobat® Reader software (Version 4.0 or higher) to read it. This free software is available for user downloading at http://www.adobe.com/products/acrobat/readstep.html.

If you have any problems with downloading your article from the Rapid Proof site, please contact rapidprooftech@cadmus.com. Include your article number (2009-0127) with all correspondence.

This file contains a reprint order form, information regarding subscriptions and special offers, instructions for correcting the PDF proof electronically, and a copy of the page proof for your article. The proof contains 11 pages.

Please read over your article carefully, as this will be your last opportunity to review the article prior to publication. It has been copyedited to conform to APA style, as described in the Publication Manual of the American Psychological Association (6th ed.), and for grammar, punctuation usage, and formal consistency. Other changes in wording are intended to more clearly convey your meaning; if meaning has been altered, please suggest an alternative that will restore the correct meaning and clarify the original passage. The references have been checked against citations; simple discrepancies have been resolved, whereas substantive edits have been flagged for your attention.

Proofread all elements of your article carefully. Be sure to check all of the following:

- Tables
- Equations and mathematical symbols
- Figures (including figure and caption placement)
- Non-English characters and symbols

Please respond to any queries that appear on the last page of the proof. Any extensive, nonessential changes and extensive changes due to author error may incur charges.

Because of APA's tightened production schedules, it is imperative that we receive any changes within 48 business hours. If you have no changes, e-mail the manuscript editor at JPSP@apa.org that you have no changes. If you do have changes, use the comments and notes features in Adobe Acrobat (instructions provided in the PDF file to be downloaded) and return an annotated PDF to JPSP@apa.org. (Please note: If the cursor gets stuck on the APA Proofs watermark, making it impossible to insert text or mark text for deletion, place the cursor to the left or right of the watermark and use the arrow keys to navigate to the text that needs alteration.) If you are unable to use Adobe Acrobat and your changes are minimal, you may summarize them in an e-mail to the manuscript editor at JPSP@apa.org, clearly indicating the location of each change. If you are unable to use Adobe Acrobat and have changes too extensive to summarize in an e-mail, please proceed as follows: Within the continental United States, send a clearly marked proof to the postal address given at the end of this message. Outside the continental United States, fax a clearly marked proof to the manuscript editor at the fax number given at the end of this message.

To order reprints, please fill out the reprint order form and return it to Cadmus Reprints, Reprint Account Manager, P.O. Box 822942, Philadelphia, PA 19182-2942.

For information about the NIH PubMed Central deposit request as it relates to articles published in APA journals, including a PubMed Central deposit request form, please go to http://www.apa.org/journals/authors/pubmed-deposit.html.

This article has not yet been selected to appear in an issue. The Editor makes all decisions concerning publication order.

If you have questions or concerns about the editing of your proof, please contact me at the e-mail address below.

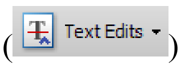
Sincerely,

Manuscript Editor
Journal of Personality and Social Psychology
APA Journals Office
750 First Street, NE
Washington, DC 20002-4242
Tel: 202-336-5540
E-mail: JPSP@apa.org
FAX (for non-U.S. authors): 202-336-5549

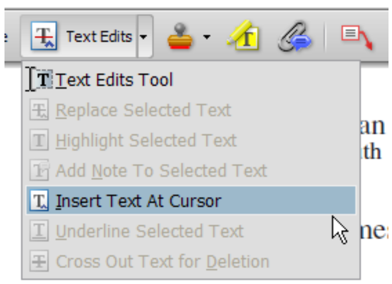
Adding Comments and Notes to Your PDF

To facilitate electronic transmittal of corrections, we encourage authors to utilize the comments and notes features in Adobe Acrobat. The PDF provided has been “comment-enabled,” which allows you to utilize the comments and notes features, even if using only the free Adobe Acrobat reader (see note below regarding acceptable versions). Adobe Acrobat’s Help menu provides additional details on the tool. When you open your PDF, the comments/notes/edit tools are clearly shown on the tool bar (though icons may differ slightly among versions from what is shown below).

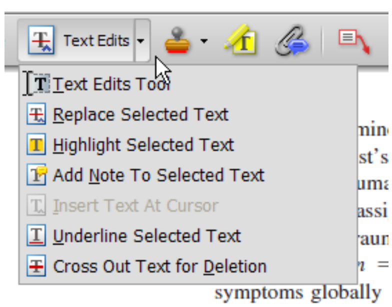
For purposes of correcting the PDF proof of your journal article, the important features to know are the following:

- Use the **Text Edits tool** (

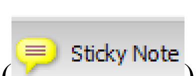
) to insert, replace, or delete text.
  - To **insert text**, place your cursor at a point in text and select “Insert Text at Cursor” from the text edits menu. Type your additional text in the pop-up box.



  - To **replace text** (do this instead of deleting and then re-inserting), highlight the text to be changed, select “Replace Selected Text” from the text edits menu, and type the new text in the pop-up box.



  - To **delete text**, highlight the text to be deleted and select “Cross Out Text for Deletion” from the text edits menu (see graphic above).

- Use the **Sticky Note tool** (

) to describe changes that need to be made (e.g., changes in bold, italics, or capitalization use; altering or replacing a figure) or to answer a question or approve a change that was posed by the editor. To use this feature, click on the sticky note tool and then click on a point in the PDF where you would like to make a comment, then type your comment in the pop-up box.

- Use the **Callout tool** () to point directly to changes that need to be made. Try to put the callout box in an area of white space so that you do not obscure the text, as in the example below.

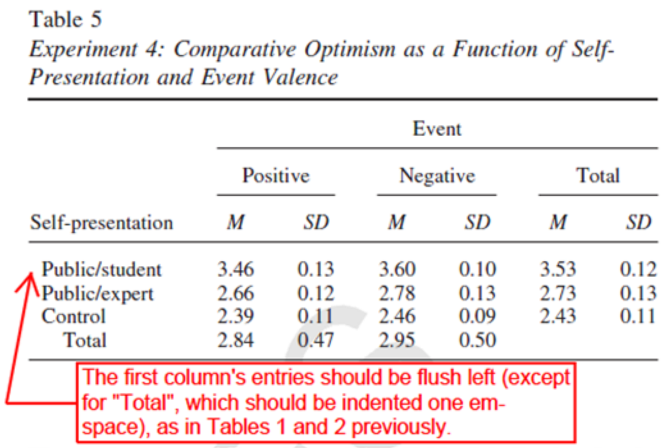
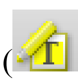
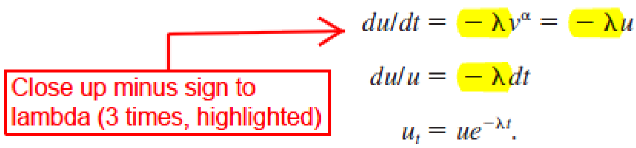


Table 5

Experiment 4: Comparative Optimism as a Function of Self-Presentation and Event Valence

	Event					
	Positive		Negative		Total	
Self-presentation	*M*	*SD*	*M*	*SD*	*M*	*SD*
Public/student	3.46	0.13	3.60	0.10	3.53	0.12
Public/expert	2.66	0.12	2.78	0.13	2.73	0.13
Control	2.39	0.11	2.46	0.09	2.43	0.11
Total	2.84	0.47	2.95	0.50		

- Use the **Highlight tool** () to indicate font problems, bad breaks, and other textual inconsistencies. Describe the inconsistencies with the callout tool (shown) or a sticky note. One callout (or sticky note) can describe many changes.



$$du/dt = -\lambda v^{\alpha} = -\lambda u$$

$$du/u = -\lambda dt$$

$$u_t = ue^{-\lambda t}.$$

An alternate method is to select the appropriate text with your cursor, select **"Add Note to Selected Text"** from the text edits menu, and then type your note in the pop-up box (the selected text is highlighted automatically).

As with hand-annotated proof corrections, the important points are to communicate changes clearly and thoroughly; to answer all queries and questions; and to provide complete information for us to make the necessary changes to your article so it is ready for publication.

To utilize the comments/notes features on this PDF you will need Adobe Reader version 7 or higher. This program is freely available and can be downloaded from http://get.adobe.com/reader/

REPRINTS

Authors have two options for ordering reprints: Authors who need to use purchase orders may order reprints from the standard *Purchase Order Service.* For a substantially lower price, authors may use the *Prepaid Service.* The rate schedules on page 3 give the prices for each service. All international prices include shipping via WWDS. All domestic shipments will be made via UPS. We request that you do not use Post Office box numbers; provide a full street address if possible. Authors may request expedited shipping – the additional cost will be billed. You are required to pay all duties that apply.

- **Prepaid Service:** To take advantage of this lower price option, submit your credit card information with your order or enclose a money order, certified check, or personal check. The prices given on page 3 include postage.

- **Purchase Order Service:** Reprint orders that are not prepaid must be accompanied by a purchase order. Cadmus Reprints will bill you later for the cost of the reprints. **Do not send remittance with the reprint order form and purchase order.** Remember that the price you see on page 3 includes postage, so it is the exact amount you will be billed. (Exception: Authors requesting expedited shipping will be billed the additional cost.)

Complete the order form on the next page and return it to Cadmus Reprints (not to APA). Only one order form is provided – include your coauthors' orders on this form or make photocopies of the order form for your coauthors. Check the box for either the prepaid service or the purchase order service. Give explicit instructions for all authors receiving reprints, using the space at the bottom of the order form.

To determine the cost of the reprints, count the number of pages in the printed article and refer to the rate schedules on page 3. For example, if your article is 11 pages long, you want 100 reprints, you live in the United States, and you are using the prepaid service, your total cost would be $126. If your proof includes a page of queries following the text, do not include the query page in your article page count.

Send the order form to Cadmus Reprints when you return the page proofs. Reprints will be mailed within two weeks of the publication of the journal. Orders received after the issue goes to press will be processed with the next issue.

Where to Order Reprints

Send your order form with credit card information, money order, certified check, personal check, or purchase order in the amount indicated on the rate schedule to:

Cadmus Reprints
P.O. Box 822942
Philadelphia, Pa 19182-2942

Phone: (410) 943-0629 FAX: (877) 705-1371

Personal checks must clear before reprints are processed. There is a $30.00 charge for returned checks.

AMERICAN PSYCHOLOGICAL ASSOCIATION

2010 REPRINT ORDER FORM

APA Journal Authors: To order reprints, complete all sections of this form. Please read the instructions on page 1.

Journal of Personality and Social Psychology

2009-0127

3573725

SEND the reprint order and
(1) credit card number, or
(2) money order/certified check, or
(3) approved purchase order, or
(4) check
to:

Cadmus Reprints
P.O. Box 822942
Philadelphia, PA 19182-2942

BILLING NAME ______________________

ORGANIZATION ______________________

ADDRESS (no P.O. Box) ______________________

____

CITY STATE ZIP CODE ______________________

ARTICLE TITLE ______________________

AUTHOR ______________________

DATE ______________________

PHONE # ______________________

FAX # ______________________

E-MAIL ______________________

REPRINTS INCLUDE COLOR? ☐ YES ☐ NO

OF TOTAL ARTICLE PAGES ______________________

OF REPRINTS ______________________

OF COVERS ______________________

PAYMENT METHOD: CHECK ONE:

___ CREDIT CARD CARD NUMBER ______________________
______ VISA EXPIRATION DATE ______________________
______ MASTERCARD SIGNATURE ______________________
___ MONEY ORDER/CERT. CHECK (make payable to **Cadmus Reprints**)
___ APPROVED PURCHASE ORDER (original PO must be attached)
___ CHECK (shipment delayed until check clears)

COMPLETE SHIPPING LABEL below. No P.O. Boxes.
Include phone number on international shipments. International shipments can be made via AIR for additional charges; please indicate in Special Shipping Instructions if you desire this expedited service.

<u>COMPUTE COST OF ORDER</u>

PRICE (per chart) $ ______________________
Add'l for Covers $ ______________________
SUBTOTAL $ ______________________
PA residents add 6% tax $ ______________________
Add'l for Expedited Shipping $ ______________________
TOTAL $ ______________________

(TYPE OR PRINT MAILING LABEL BELOW)

SHIP TO: Phone No. ______________________
Name ______________________
Address ______________________
____
City ______________________ State ___________ Zip ______________
Expedited Service (enter service required): ______________________

AMERICAN PSYCHOLOGICAL ASSOCIATION

RATES EFFECTIVE WITH 2010 ISSUES

Black and White Reprint Prices Prepaid

Domestic (USA only)

# of Pages	50	100	200	300	400	500
1-4	$57	$76	$86	$117	$148	$179
5-8	$73	$98	$147	$194	$243	$293
9-12	$94	$126	$198	$275	$352	$432
13-16	$107	$156	$254	$352	$452	$550
17-20	$126	$186	$305	$434	$556	$681
21-24	$146	$213	$362	$511	$658	$810
Covers	$67	$75	$99	$124	$152	$179

Color Reprint Prices Prepaid

Domestic (USA only)

# of Pages	50	100	200	300	400	500
1-4	$120	$204	$287	$385	$447	$489
5-8	$188	$246	$367	$536	$648	$759
9-12	$208	$272	$423	$622	$818	$968
13-16	$224	$294	$483	$708	$934	$1,157
17-20	$246	$318	$546	$799	$1,050	$1,352
21-24	$269	$342	$609	$888	$1,168	$1,552
Covers	$67	$75	$99	$124	$152	$179

Black and White Reprint Prices Prepaid

International (includes Canada and Mexico)

# of Pages	50	100	200	300	400	500
1-4	$84	$101	$124	$176	$223	$275
5-8	$115	$136	$222	$301	$385	$469
9-12	$154	$185	$306	$437	$558	$690
13-16	$185	$232	$395	$560	$725	$888
17-20	$223	$282	$481	$693	$894	$1,098
21-24	$256	$323	$569	$817	$1,062	$1,308
Covers	$96	$103	$148	$202	$255	$308

Color Reprint Prices Prepaid

International (includes Canada and Mexico)

# of Pages	50	100	200	300	400	500
1-4	$148	$229	$325	$444	$522	$585
5-8	$230	$284	$442	$643	$790	$934
9-12	$268	$331	$531	$784	$1,024	$1,226
13-16	$302	$370	$625	$915	$1,207	$1,496
17-20	$343	$414	$722	$1,058	$1,388	$1,769
21-24	$379	$452	$817	$1,194	$1,572	$2,050
Covers	$96	$103	$148	$202	$255	$308

Black and White Reprint Prices Purchase Order

Domestic (USA only)

# of Pages	50	100	200	300	400	500
1-4	$62	$83	$93	$127	$161	$194
5-8	$80	$106	$159	$210	$264	$318
9-12	$102	$137	$215	$299	$382	$469
13-16	$116	$170	$275	$382	$491	$596
17-20	$137	$202	$331	$471	$603	$739
21-24	$158	$231	$393	$555	$714	$879
Covers	$73	$81	$108	$134	$165	$194

Color Reprint Prices Purchase Order

Domestic (USA only)

# of Pages	50	100	200	300	400	500
1-4	$130	$221	$311	$417	$485	$531
5-8	$204	$267	$398	$581	$704	$823
9-12	$225	$295	$459	$675	$887	$1,050
13-16	$243	$319	$524	$768	$1,014	$1,256
17-20	$267	$345	$592	$867	$1,139	$1,467
21-24	$292	$371	$661	$963	$1,267	$1,683
Covers	$73	$81	$108	$134	$165	$194

Black and White Reprint Prices Purchase Order

International (includes Canada and Mexico)

# of Pages	50	100	200	300	400	500
1-4	$91	$110	$134	$191	$242	$298
5-8	$125	$147	$240	$327	$417	$509
9-12	$168	$201	$332	$474	$606	$749
13-16	$200	$252	$429	$607	$787	$964
17-20	$242	$306	$522	$752	$970	$1,191
21-24	$278	$350	$617	$886	$1,152	$1,420
Covers	$104	$111	$160	$220	$277	$335

Color Prices Purchase Order

International (includes Canada and Mexico)

# of Pages	50	100	200	300	400	500
1-4	$160	$249	$352	$482	$566	$634
5-8	$250	$308	$479	$698	$857	$1,014
9-12	$291	$360	$576	$850	$1,111	$1,331
13-16	$327	$401	$678	$993	$1,310	$1,623
17-20	$372	$449	$783	$1,148	$1,506	$1,919
21-24	$411	$490	$886	$1,295	$1,705	$2,224
Covers	$104	$111	$160	$220	$277	$335

Additional Rates	
Set title page, each	$16.00
Each extra mailing	$32.00
Remake pages, each	$50.00

Subscriptions and Special Offers

In addition to purchasing reprints of their articles, authors may purchase an annual subscription, purchase an individual issue of the journal (at a reduced rate), or request an individual issue at no cost under special "hardship" circumstances.

To place your order, fill out the order form below (including the mailing label) and send the completed form and your check or credit card information to the address listed on the order form.

For information about becoming a member of the American Psychological Association, call the Membership Office at 1-800-374-2721.

2010 APA Journal Subscription Rates

Journal*	Non-agent Individual Rate	APA Member Rate
American Psychologist	$ 289	$ 12
Behavioral Neuroscience	$ 300	$ 152
Developmental Psychology	$ 261	$ 117
Emotion	$ 100	$ 55
Experimental & Clinical Psychopharm.	$ 156	$ 55
Health Psychology	$ 167	$ 67
Jrnl of Abnormal Psychology	$ 167	$ 72
Jrnl of Applied Psychology	$ 261	$ 101
Jrnl of Comparative Psychology	$ 100	$ 55
Jrnl of Consulting & Clinical Psychology	$ 261	$ 122
Jrnl of Counseling Psychology	$ 135	$ 55
Jrnl of Educational Psychology	$ 167	$ 78
JEP: Animal Behavior Processes	$ 100	$ 55
JEP: Applied	$ 100	$ 55
JEP: General	$ 100	$ 55
JEP: Human Perception & Performance	$ 366	$ 162
JEP: Learning, Memory & Cognition	$ 366	$ 162

Journal*	Non-agent Individual Rate	APA Member Rate
Jrnl of Family Psychology	$ 156	$ 55
Jrnl of Personality & Social Psychology	$ 512	$ 228
Neuropsychology	$ 156	$ 55
Professional Psych.: Research & Practice	$ 135	$ 55
Psychological Assessment	$ 156	$ 55
Psychological Bulletin	$ 261	$ 102
Psychological Methods	$ 100	$ 55
Psychological Review	$ 167	$ 76
Psychology & Aging	$ 167	$ 72
Psychology of Addictive Behaviors	$ 100	$ 75
Psychology, Public Policy & Law	$ 100	$ 55
Rehabilitation Psychology	$ 100	$ 55
Clinician's Research Digest	$100	$55

*For journal descriptions, see APA's website: http://www.apa.org/journals

CUT ALONG DASHED LINE – RETURN LOWER PORTION TO APA ORDER DEPARTMENT

Instructions: Check the appropriate box, enter journal title and price information, and complete the mailing label in the right column. Enclose a check made out to the **American Psychological Association**, and mail it with the form to the APA Order Department or complete the credit card information below.

☐ Annual Subscription (available on January-December basis only). To subscribe, specify calendar year of the subscription. Refer to the Subscription Rates shown above.

Journal: ____

Calendar year of subscription: ___________ Price: ___________

Special Offers! If you are an APA journal article author, you may take advantage of two Special Offers. (These offers do not apply to Educational Publishing Foundation journals.)

☐ **Individual Copy.** You may order individual copies of the entire issue in which your article appears. As an author, you receive a special reduced rate of $5 per copy for up to a maximum of 25 copies. No phone requests accepted.

Journal: ____

Vol. no.: _______ Issue no.: _______ Issue month: _________

____ copies @ $5 a copy = $________ (order amount)
+________ (handling; see below)
TOTAL enclosed: $________

Handling Fees		
Order amount:	U.S.	International
< $15	$5	$15
$15 - $60	$6	$16
> $60	Order amount X .10	$20

☐ **Hardship Request.** If you do not have a personal subscription to the journal and you do not have access to an institutional or departmental subscription copy, you may obtain a single copy of the issue in which your article appears at no cost by filing out the information below.

Journal: ____

Vol. no. : ________________ Issue no.: ________________

Issue month: ____

CREDIT CARD PAYMENT

___ VISA ___ MASTERCARD ___ AMERICAN EXPRESS

CARD NUMBER____

Expir. Date ___________ Signature _________________________

PRINT CLEARLY – THIS IS YOUR MAILING LABEL

SHIP TO: Phone No. ____________________

Name ______________________________________

Address ____________________________________

____

City _______________ State ________ Zip ________

Expedited Service (enter service required): _____________

Send the completed form and your check, made out to the **American Psychological Association**, or your credit card information to:

APA Order Department
750 First Street, NE
Washington, DC 20002-4242

All orders must be prepaid. Allow 4-6 weeks after the journal is published for delivery of a single copy or the first copy of a subscription.

Journal of Personality and Social Psychology
2010, Vol. ●●, No. ●, 000–000

0022-3514/10/$12.00 DOI: 10.1037/a0018962

How Does Cognitive Control Reduce Anger and Aggression? The Role of Conflict Monitoring and Forgiveness Processes

Benjamin M. Wilkowski
University of Wyoming

Michael D. Robinson and Wendy Troop-Gordon
North Dakota State University

It is well-established that superior cognitive control abilities are associated with lower levels of anger and aggression. However, the precise emotion regulation operations underlying this relationship have been underspecified and underexplored in previous research. Drawing on neuropsychological models of cognitive control, the authors propose that limited capacity resources can be recruited within a hostile situation to promote a process of forgiveness. The results of 2 studies supported this proposal. Across studies, individual differences in hostility-primed cognitive control were assessed implicitly. In Study 1, hostility-primed cognitive control predicted less aggressive behavior in response to a laboratory provocation. Moreover, forgiveness mediated these effects. In Study 2, hostility-primed cognitive control predicted forgiveness of provocations in participants' daily lives and subsequent reductions in anger. In sum, the results contribute to a systematic understanding of how cognitive control leads to lower levels of anger and aggression.

Keywords: anger, aggression, cognitive control, forgiveness, emotion regulation

Psychologists have long been interested in how human beings control their darker impulses. Freud (1920/1955) proposed the ego and the superego as entities that regulate the aggressive death wish of the id. Similarly, Lorenz (~~1966~~) contended that an inhibitory mechanism lies within the human nervous system, containing our natural instinct for aggression. [AQ: 1]

In modern times, psychologists have posited that a *cognitive control system* (i.e., effortful control system; executive function system) is involved in regulating anger and aggression (Eisenberg, Smith, Sadovsky, & Spinrad, 2004; Posner & Rothbart, 2000). This system is neurologically situated within the prefrontal cortex and is conceptualized as a limited capacity resource used to override inappropriate thoughts, urges, and behaviors (Baumeister, Heatherton, & Tice, 1994; Rueda, Posner, & Rothbart, 2004). Some individuals demonstrate more efficient functioning of this system than others, and a variety of self-report, informant-report, and implicit cognitive measures have been developed to measure these differences (e.g., Morgan & Lilienfeld, 2000; Rueda et al., 2004). A[...] developmental (Kochanska, Murray, & Ha[...] 2000), clinical/forensic (Morgan & Lilienfeld, 2000), and social/personality investigations (Tangney, Baumeister, & Boone, 2004; Wilkowski & Robinson, 2008b), superior cognitive control has proven to be systematically related to lower dispositional levels of anger and aggression (see Wilkowski & Robinson, 2008a, ~~in press,~~ for recent reviews). [AQ: 2] [AQ: 3]

Despite such insights, it remains unclear how cognitive control reduces anger and aggression. Recent theories (e.g., Gross & Thompson, 2007) point to a wide variety of potentially relevant operations, including distraction from hostile thoughts (Bushman, 2002), the reappraisal of provocations (Zillmann & Cantor, 1976), forgiveness of provocations (McCullough, Fincham, & Tsang, 2003; Yovetich & Rusbult, 1994), and suppression of aggressive impulses (DeWall, Baumeister, Stillman, & Gailliot, 2007). Drawing on conflict monitoring theory (Botvinick, Braver, Barch, Carter, & Cohen, 2001), we propose that forgiveness plays a critical role in the cognitive control of anger and aggression.

Conflict Monitoring Theory

Recall a time when you felt provoked by a close friend or loved one. If you are like most people, you will probably report conflicting desires in this situation. Although the desire for revenge is pervasive following such betrayals (McCullough et al., 2003; Troop-Gordon & Asher, 2005), a single negative encounter seldom eliminates our desire to continue a valued social relationship entirely (de Waal, 2000; Fischer & Roseman, 2007). According to conflict monitoring theory (Botvinick et al., 2001), this is precisely the type of situation in which cognitive control is needed. Proponents of this theory argue that cognitive control resources are recruited to resolve conflict between two simultaneously activated but incompatible responses.

This theory has typically been investigated with simplified interference tasks, such as the Stroop (1935) or flanker (Eriksen & Eriksen, 1974) tasks. When response conflict is first introduced in such tasks, participants' responses are slowed considerably (Eriksen & Eriksen, 1974; Gratton, Coles, & Donchin, 1992). However, response conflict is quickly registered within the anterior cingulate

AQ Benjamin M. Wilkowski, Department of Psychology, University of Wyoming; Michael D. Robinson and Wendy Troop-Gordon, Department of Psychology, North Dakota State University.

This work was part of Benjamin M. Wilkowski's doctoral dissertation, funded by a predoctoral fellowship from the National Science Foundation's North Dakota Experimental Program to Stimulate Competitive Research program.

Correspondence concerning this article should be addressed to Benjamin M. Wilkowski, Department of Psychology, University of Wyoming, Department 3415, 1000 East University Avenue, Laramie, WY 82071. E-mail: bwilkows@uwyo.edu

cortex (Botvinick, Nystrom, Fissell, Carter, & Cohen, 1999), leading to the recruitment of cognitive control resources within the dorsolateral prefrontal cortex (Botvinick et al., 2001). Once these resources are recruited, participants are more capable of resolving response conflict, as evidenced by reduced interference effects on immediately subsequent trials (Botvinick et al., 1999; Gratton et al., 1992).

Cognitive Control and Forgiveness

We propose that conflict monitoring theory (Botvinick et al., 2001) suggests a means by which cognitive control resources can be used to regulate anger and aggression. First, proponents of this theory argue that cognitive control should be conceptualized not as a static ability but instead as a resource that can be recruited on a situation-specific basis. Accordingly, it may be more important to focus on whether an individual recruits and uses these resources in hostile situations than to focus on whether individuals exhibit such abilities under baseline conditions.

Furthermore, this theory suggests that some individuals should recruit cognitive control in hostile circumstances. Because of the conflicting goals that arise from provocations (de Waal, 2000; Troop-Gordon & Asher, 2005), some individuals should be more likely to recruit cognitive control resources under these conditions. Indeed, a recent investigation indicates that individuals low in self-reported trait anger exhibit superior abilities to resolve response conflict following the activation of hostile thoughts (Wilkowski & Robinson, 2008b).

Once a person has recruited cognitive control, they should be more capable of inhibiting socially inappropriate goals toward revenge (Botvinick et al., 2001; Wilkowski & Robinson, ~~in press~~). This suggestion is highly consonant with recent theorizing in the forgiveness literature. Forgiveness has been conceptualized as a process of motivational change (Fincham, Hall, & Beach, 2006; McCullough et al., 2003; Yovetich & Rusbult, 1994). This change is displayed in several fashions, including a decrease in avoidance motivation and an increase in benevolent motivation. Most critical to current concerns, however, is the idea that the motivation for revenge and retaliatory aggression is actively decreased through the forgiveness process. In this article, we specifically focus on the revenge-reduction aspects of forgiveness.

Forgiveness is best conceptualized as a continuous process. It begins with a decision to forgive one's provocateur (Fincham et al., 2006) and continues as one inhibits the desire for revenge (Karremans & van Lange, 2004; McCullough et al., 2003). Cognitive control resources are seen as essential in this regard, allowing one to exert top-down control over goal activation (Finkel & Campbell, 2001; Yovetich & Rusbult, 1994). Only when one has set aside feelings of anger toward the offending party is the process of forgiveness complete (Fincham et al., 2006; Witvliet, Ludwig, & Laan, 2001).

In making the case that hostility-primed cognitive control facilitates forgiveness, we seek to differentiate forgiveness from the seemingly similar process of *expressive suppression* (Gross & Thompson, 2007). Expressive suppression involves containing the external expression of anger but not ridding one's self of the internal desire for revenge. Research has shown that suppression has only limited success in altering emotional experiences (Gross & Thompson, 2007). Forgiveness, by contrast, involves altering one's internal motivational orientation (McCullough et al., 2003; Yovetich & Rusbult, 1994). Thus, it is quite successful in reducing angry feelings (Witvliet et al., 2001), though it does require adequate time to achieve this goal (Fincham et al., 2006; Finkel, Rusbult, Kumashiro, & Hannon, 2002). In the current investigation, we predicted that forgiveness, but not expressive suppression, would be a critical mechanism linking cognitive control to lower levels of anger and aggression.

The Current Investigation

We conducted two studies to test the potential roles of forgiveness and expressive suppression in the cognitive control of anger and aggression. Across both studies, hostility-primed cognitive control was assessed implicitly, with a paradigm developed in prior research (Wilkowski & Robinson, 2008b). On each trial of this task, a hostile or nonhostile thought was first primed. According to the proposed model, certain individuals should be more likely to recruit cognitive control resources following the activation of a hostile thought, and the next component of the task was designed to assess this. One trial of Eriksen and Eriksen's (1974) flanker task was administered following each prime word. Participants were presented with a series of five letters and asked to indicate the identity of the central letter. On congruent trials, all of the letters were identical (e.g., *qqqqq*). On incongruent trials, however, the central letter differed from the surrounding flanker letters (e.g., *qqpqq*). Because of the conflicting responses primed on these trials, reaction times tend to be quite a bit slower on incongruent trials, compared with congruent trials (Eriksen & Eriksen, 1974).

If an individual does recruit cognitive control resources following hostile primes, they should become more efficient at overcoming response conflict. Such a phenomenon is specifically reflected in a reduced flanker cost following hostile primes. This measure of hostility-primed cognitive control is correlated with lower levels of trait anger (Wilkowski & Robinson, 2008b), though the mechanisms for this relationship have yet to be established.

To investigate these mechanisms, we used hostility-primed cognitive control to predict participants' responses to provocations as they occurred in real time. In Study 1, we sought to investigate the earliest phases of the forgiveness process under tightly controlled laboratory conditions. A standardized provocation was administered, and participants' response was measured. In Study 2, we sought to examine the more extended aspects of the forgiveness process as they occurred in participants' daily lives. Participants completed a daily diary protocol, reporting on provocations they encountered and their ensuing response. We predicted that with sufficient time, hostility-primed cognitive control would lead to lower levels of aggression and anger. Furthermore, we predicted that forgiveness, but not expressive suppression, would be the critical emotion regulation operation leading to these effects.

Study 1

In Study 1, individual differences in hostility-primed cognitive control were assessed during an initial laboratory session, with the primed flanker task described above. Approximately 1 week later, participants returned to complete a well-validated laboratory aggression paradigm, namely Taylor's (1967) competitive reaction

tapraid5/z2g-perpsy/z2g-perpsy/z2g00510/z2g3593d10z | xppws | S=1 | 2/22/10 | 16:58 | Art: 2009-0127

time task (see Bushman & Anderson, 1998, for a review of validation-related research). In this task, participants are provoked through the administration of loud white noise blasts supposedly chosen by an opponent. They are then given the opportunity to retaliate aggressively by administering loud noise blasts to their opponent. State anger was assessed before and after this task, and participants also reported on their use of expressive suppression and forgiveness after the task.

At a global level, we predicted that hostility-primed cognitive control would predict lower aggression (Hypothesis 1). Beyond this, we sought to provide converging sources of evidence that forgiveness was an essential mechanism leading to these effects. We predicted that individuals high in hostility-primed cognitive control would be especially likely to exhibit lower levels of aggression under conditions that encourage forgiveness. We thus predicted that a delay following provocation (McCullough et al., 2003) and the obtainment of recompense from the offending party (see Witvliet et al., 2001) would strengthen the relationship between hostility-primed cognitive control and lower aggression (Hypothesis 2).

Furthermore, we theorized that hostility-primed cognitive control would affect participants' self-reported revenge motivation. Because the inhibition of revenge motivation is a core aspect of the forgiveness process (e.g., McCullough et al., 2003), participants high in hostility-primed cognitive control should report lower levels of revenge motivation (Hypothesis 3). We expected that this pattern would be specific to forgiveness and that it would not extend to expressive suppression. Finally, we expected that lower levels of revenge motivation would mediate the relationship between hostility-primed cognitive control and aggressive behavior (Hypothesis 4). If all such hypotheses were found, it would provide converging support for the idea that forgiveness is a key process in cognitive control of aggression.

Method

Participants. Seventy undergraduate psychology students from North Dakota State University participated in exchange for course credit (40 female, 30 male; age $M = 20$ years; 60 Caucasians; 8 Asian/Pacific Islanders, 1 Hispanic; 1 Native American/American Indian).

Apparatus. All participants completed laboratory sessions on one of six computers equipped with headphones and a button box. E-Prime software (Version 1.2) was used to collect all data.

Measuring individual differences in hostility-primed cognitive control.

Prime stimuli. Ten aggressive action words (stimuli = *argue, assault, demean, harm, harass, hurt, kick, punch, shove, torment*) were drawn from a thesaurus for use in this task. Nonhostile control words came from an equally coherent and concrete semantic category related to housecleaning actions (stimuli = *bathe, brush, mop, neaten, polish, rinse, scrub, shower, sweep, vacuum*). These control stimuli were nonhostile in nature but were matched in terms of part of speech (i.e., verbs), word length, and word frequency ($ps > .70$).

Task procedures. On individual trials of the task, one of the 20 prime stimuli was randomly selected and presented at center screen. Participants were asked to categorize this word by pressing either the 1 button or the 5 button of a button box, with response mappings counterbalanced across participants (i.e., for some, 1 = *aggressive*; for others, 1 = *housecleaning*). Following the response, there was typically a 1,000 ms blank delay. Following errors, however, participants were given a 1,500 ms error message and were asked to recategorize the word correctly. Such procedures ensured that the relevant thought (hostile or nonhostile) had been successfully activated prior to the assessment of cognitive control.

Following each prime, participants completed one trial of the flanker task (Eriksen & Eriksen, 1974). One of two congruent strings (*qqqqq, ppppp*) or two incongruent letter strings (*qqpqq, ppqpp*) was randomly selected and presented. This letter string was vertically centered, but its horizontal position varied from trial to trial, to avoid location-related habituation effects (Tipper, Borque, Anderson, & Brehaut, 1989). Participants were asked to use the button box to identify the central letter ($1 = q$; $5 = p$). Following the participants' response, there was typically a 700 ms pause until the next trial. However, a 1,500 ms error message followed all errors. There were 120 trials in all. Participants were exposed to each prime word exactly six times and each flanker letter string exactly 30 times. Furthermore, each prime was followed by an incongruent letter string exactly three times and by a congruent letter string exactly three times.

Quantifying individual differences in hostility-primed cognitive control. Reaction time (RT) data were handled in accordance with established recommendations (Robinson, 2007). Trials involving an incorrect response for the flanker stimulus were first discarded (4.01% of all trials).[1] RTs were next log-transformed to correct for a skewed distribution. Finally, outlying RTs 2.5 standard deviations below or above the mean (1.91% of all trials) were windsorized. Fn1

We next calculated flanker costs (i.e., incongruent RT minus congruent RT) following both hostile and nonhostile primes. In Study 1, the flanker cost tended to be reduced following hostile primes (difference $M = 158$ ms) relative to nonhostile primes (difference $M = 167$ ms), although this normative effect did not reach significance ($p = .10$). Regardless, individuals differed in this respect, and such individual differences were the central focus of this investigation.

We next examined the relationship between flanker costs across the two prime contexts in a regression analysis. As anticipated, they were positively related but not so highly related as to suggest equivalence ($\beta = .44$, $p = .0002$). To quantify reductions in the flanker cost specific to hostile primes, we used the obtained regression equation to calculate residual scores (Cohen, Cohen, West, & Aiken, 2003). Such residual scores were necessarily uncorrelated with flanker costs following nonhostile primes but were highly related to the raw flanker costs following hostile primes ($\beta = .85$, $p < .0001$). Finally, residual scores were multiplied by -1, such that higher scores reflected greater tendencies toward hostility-primed cognitive control. It is worth mentioning that flanker costs following nonhostile primes did not predict any of the critical dependent measures in either study of this investigation ($ps > .30$). Also, there were no significant gender

[1] Prime type never significantly influenced error rates on the flanker task in either study in any fashion.

tapraid5/z2g-perpsy/z2g-perpsy/z2g00510/z2g3593d10z | xppws | S=1 | 2/22/10 | 16:58 | Art: 2009-0127

Fn2 differences[2] in hostility-primed cognitive control in either study ($ps > .25$).

Competitive RT task. Following the initial laboratory session, participants returned approximately 1 week later to complete the competitive RT task (Taylor, 1967). In this task, participants were told that they were competing against an opponent to respond as quickly as possible to an auditory tone. As a way to motivate them to respond more quickly, the winner of each trial was allowed to choose the intensity of a white noise blast for the loser to receive. In reality, there was no opponent. Instead, the computer randomly determined the winner of each trial and the intensity of the noise blast received following lost trials. The critical measure of aggression was the average noise intensity that participants selected for their opponent.

On each trial, participants first choose the level of noise that their opponent would receive in the event they won. There were nine levels of white noise, ranging at 5 dB intervals from 60 dB to 100 dB. There was also a nonaggressive, no noise option. Participant responses were coded in terms of a 0 (*no noise*) to 9 (*100 dB*) scale. Ensuring the appearance of an actual human opponent, there was 0–4 randomized waiting period, during which the participant was told to wait for his or her opponent's selection. To ensure the appearance of a difficult RT task, participants were next told to "Get ready to press the button" for a randomized period between 1 s and 2 s, in directions given prior to the presentation of the auditory tone. In no way did these randomized waiting periods constitute a substantive manipulation within the study. Participants were instructed to press the space bar as quickly as possible upon hearing the tone.

In support of the cover story, participants automatically lost if they did not respond within 750 ms (5.6% of all trials). Otherwise, the computer randomly awarded victory to the participant on 12 trials and to the opponent on the remaining 13 trials. This outcome, as well as the intensity of the upcoming noise blast, was conveyed to the participant via a 2.5 s message. In the case of a participant victory, a 1 s message followed indicating that the opponent was receiving the previously selected noise blast. In the case of a participant defeat, the participant received the previously indicated noise blast for 1 s. Participants received each of the following noise blasts during the task: 65 dB, 65 dB, 70 dB, 75 dB, 75 dB, 80 dB, 85 dB, 85 dB, 90 dB, 95 dB, 95 dB, 100 dB, and 100 dB, with the order of blasts randomly generated by the computer for each participant. There were 25 trials in all.

Following the laboratory aggression task, participants completed a full funnel probe for suspicion (Bargh & Chartrand, 2000), in which their beliefs concerning the existence of their opponent were subtly probed without overtly revealing the deception. Prior research with this task in multiple laboratories (e.g., Bartholow, Anderson, Carnagey, & Benjamin, 2005; Meier, Robinson, & Wilkowski, 2006) has typically yielded a suspicion rate of approximately 5%–10%. The current study yielded a comparable rate, with 5 of 70 participants (7%) expressing some suspicion concerning whether their opponent was real. Data from these 5 participants were deleted in the analyses reported below. It is, however, worth noting that results remained essentially unchanged if suspicious participants were left in the analysis.

State anger measures. Immediately before and after the task, participants reported their current level of anger with the hostility-related markers from Watson and Clark's (1994) PANAS-X (items = angry, hostile, irritated, disgusted, loathing, scornful). Participants rated the intensity of each of these feelings with a 1 (*not at all*) to 5 (*extremely*) response format. The scale was reliable both before ($\alpha = .81$) and after ($\alpha = .75$) the competitive RT task. There was a normative increase in state anger from pretask (M = 1.44) to posttask (M = 1.61), $t() = 2.40$, $p = .02$. AQ: 4

Anger regulation measures. Finally, participants' use of expressive suppression and forgiveness were measured. As indicated in the introduction, a core aspect of forgiveness involves reducing revenge motivation over time (McCullough et al., 2003). As such, we measured forgiveness through the tendency to continue to desire revenge following the task. Specifically, participants were asked, "If you had the opportunity to face your opponent in the competitive RT task again, would you want to 'get even' with them?" Expressive suppression was assessed with the question, "Did you try to restrain yourself from choosing loud noise levels to 'get even' with your opponent?" Responses were recorded along a 1 (*no, not at all*) to 7 (*definitely*) scale.

Results

Average noise intensity selections. It was hypothesized that individuals higher in hostility-primed cognitive control would be less aggressive in their selection of loud noise blasts (Hypothesis 1). This proved to be the case, as hostility-primed cognitive control was negatively correlated with participants' average noise intensity selections ($r = -.25$, $p = .04$).

Effect of forgiveness opportunity. To provide an initial source of evidence that forgiveness is a key process responsible for the above effects, we next tested the hypothesis that hostility-primed cognitive control would most strongly predict aggression under conditions that encourage forgiveness. It has been demonstrated that forgiveness increases as the time since provocation increases (e.g., McCullough et al., 2003) and when some measure of recompense has been obtained from the offending party (e.g., Witvliet et al., 2001). Within the current task, trials immediately following a loss and the delivery of loud noise would satisfy neither of these conditions. As such, these trials were coded as low-forgiveness opportunity trials. However, a participant win following a prior loss would satisfy both of the above conditions. That is, they provide time following the initial provocation to encourage forgiveness (McCullough et al., 2003), and they also provide participants with the impression that some degree of recompense (i.e., the participant victory & prior opportunity to punish the opponent) had been obtained. Accordingly, these trials were coded as high-forgiveness opportunity trials.

We performed an analysis with the general linear model, in which forgiveness opportunity (high vs. low) was entered as a

[2] We also tested whether gender moderated all effects of theoretical interest. In only one case did such an effect reach significance (other $ps > .33$). In Study 1, gender interacted with hostility-primed cognitive control in predicting average noise blast intensity ($\beta = -.32$, $p < .05$). Hostility-primed cognitive control was related to lower noise selections for women ($b = -.83$, $p < .05$) but not for men ($p = .33$). In the context of interpersonal competition, it is possible that men consider moderate aggression to be acceptable and compatible with relationship-oriented goals. However, because this pattern failed to replicate in any other analysis, caution should be used in its interpretation.

within-subject predictor and hostility-primed cognitive control (continuous) was entered as a between-subjects predictor of noise intensity selections. Replicating the correlational analysis, this analysis yielded a main effect of hostility-primed cognitive control, $F(1, 63) = 4.66$, $p = .03$. There was also some indication that noise intensity selections were lower when the opportunity for forgiveness was high ($M = 4.8$) rather than low ($M = 5.0$), although this trend was not significant, $F(1, 63) = 2.84$, $p = .09$.

It is more important that the critical hostility-primed Cognitive Control × Forgiveness Opportunity interaction was significant, $F(1, 63) = 5.47$, $p = .02$, $\eta_p^2 = .08$, with a medium effect size (Cohen, 1987). To further probe the nature of this interaction, average noise intensity selections for each forgiveness opportunity condition were calculated for participants high ($M + 1\ SD$) or low ($M – 1\ SD$) in hostility-primed cognitive control (Aiken & West, 1991). Simple slope analyses were conducted to determine whether the effect of forgiveness opportunity was significant at the different levels of hostility-primed cognitive control (Aiken & West, 1991).

F1 As can be seen in Figure 1, participants high in hostility-primed cognitive control exhibited signs of actively reducing their aggressive behavior, given the opportunity for forgiveness, $F(1, 63) = 8.10$, $p = .006$. By contrast, participants low in hostility-primed cognitive control displayed no reduction in aggression due to an increasing forgiveness opportunity ($F < 1$). Such results suggest that although individuals high in hostility-primed cognitive control initially become motivated toward aggression following a provocation, they can reduce these inclinations as opportunities for forgiveness increase.

Anger regulation measures. To provide an additional source of evidence that forgiveness is a key component in the cognitive control of aggression, we next examined participants' self-reported revenge motivation. Because the reduction of revenge motivation is one core component of forgiveness (e.g., McCullough et al., 2003), we expected hostility-primed cognitive control to be inversely correlated with this variable (Hypothesis 3). This proved to be the case ($r = -.26$, $p = .03$). Moreover, this relationship was specific to revenge motivation, as there was no relationship between hostility-primed cognitive control and expressive suppression ($r = -.02$, $p = .83$).

Mediational analysis. Finally, it was hypothesized that revenge motivation would mediate the relationship between hostility-primed cognitive control and aggression (Hypothesis 4). To test this, we simultaneously entered hostility-primed cognitive control and revenge motivation as predictors of aggressive behavior (Baron & Kenny, 1986). Consistent with hypotheses, revenge motivation continued to significantly predict aggressive behavior ($\beta = .30$, $p = .015$), whereas hostility-primed cognitive control did not ($\beta = -.17$, $p = .16$).

To more directly demonstrate mediation, we used the bootstrapping technique recommended by Preacher and Hayes (2004). This technique is more statistically appropriate than alternative measures of the indirect effect (e.g., the Sobel test), in that it does not assume a normal distribution of indirect effect sizes (MacKinnon, Lockwood, & Williams, 2004). According to this test, the indirect effect was significant, as the 95% confidence interval estimates excluded zero (range: $b = -.002$ to $-.37$).

State anger. Prior theory and data (Fincham et al., 2006; Finkel et al., 2002) suggest that reductions in anger are an end result of the forgiveness process and are not apparent at earlier stages. Thus, we did not necessarily expect hostility-primed cognitive control to predict anger within the short time span of Study 1. Indeed, hostility-primed cognitive control was not related to state anger before ($r = .11$, $p = .36$) or after ($r = -.02$, $p = .85$) the task. We return to this issue in Study 2.

Discussion

Drawing on conflict monitoring theory (Botvinick et al., 2001), we predicted that forgiveness would be a critical mechanism in the cognitive control of aggressive behavior. As a test of this prediction, participants completed an implicit measure of hostility-primed cognitive control and then returned to complete a well-validated laboratory aggression paradigm. Consistent with predictions, participants high in hostility-primed cognitive control were less aggressive in their behavior. Moreover, there were several converging sources of evidence that this was due to a forgiveness process. Although participants high in hostility-primed cognitive control were somewhat aggressive immediately following a provocation, they significantly reduced their aggressive tendencies as the opportunity for forgiveness increased. Furthermore, these individuals reported lower levels of revenge motivation (a core component of the forgiveness process; e.g., McCullough et al., 2003). Indeed, revenge motivation mediated the effects of hostility-primed cognitive control on aggressive behavior.

Could the results of Study 1 be due to confounding cognitive processes? For example, one might speculate that certain individuals have highly developed semantic networks involving aggressive concepts (e.g., Berkowitz, 1993). These individuals may be distracted by their ongoing hostile thoughts following hostile primes, making it difficult to move on to the flanker task. Given the relatively long delay between primes and flanker stimuli in this task (i.e., 1000 ms), this explanation becomes less plausible. Automatic priming effects subside well before this time period (see Neely, 1991). As such, the distraction by one's semantic networks would have subsided well before the flanker stimulus appears.

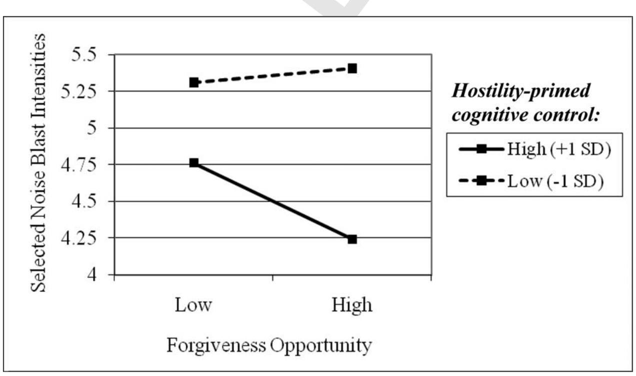


Figure 1. Selected noise blast intensity as a function of hostility-primed cognitive control and forgiveness opportunity in Study 1.

Study 2

Fincham et al. (2006) have conceptualized forgiveness as a process that begins with the decision to forgive one's provocateur and concludes when one has left behind feelings of anger. In Study 2, we predicted that hostility-primed cognitive control would facilitate both the commencement and the completion of this process. To complement the laboratory methodology used in the prior study, we used a more ecologically valid procedure to assess later aspects of the forgiveness process in Study 2. In this study, participants were asked to complete a 3-week daily diary protocol in which they reported on provocations, forgiveness, expressive suppression, and daily anger. We hypothesized that individuals high in hostility-primed cognitive control would be more likely to forgive on high provocation days (Hypothesis 5). Moreover, we expected that these individuals would be more effective in reducing anger on the days following forgiveness (Hypothesis 6). As in Study 1, we predicted that these effects would be specific to forgiveness and would not be apparent for expressive suppression.

Method

Participants. Study 2's sample consisted of 51 undergraduate psychology students from North Dakota State University (33 female, 18 male, age M = 19.5; 44 Caucasians; 2 African Americans; 5 Asian/Pacific Islanders). Participants were compensated with four extra credit points for the laboratory session and up to $25 for the daily protocol (contingent on response rates).

Apparatus. The equipment used in this study was identical to that used in Study 1, with the addition that SONA Internet software was used to collect data for the daily survey.

Measuring hostility-primed cognitive control. Hostility-primed cognitive control was assessed with the same primed flanker task as in Study 1. RTs from this task were handled as before (errors discarded = 6.5% of trials; outliers windsorized = 2.0% of trials). In Study 2, the magnitude of the flanker cost (incongruent RT minus congruent RT) was significantly reduced following hostile primes (difference M = 133 ms) relative to nonhostile primes (difference M = 159 ms), $F(1, 50) = 4.75$, p = .03. This result supports the idea that hostile thoughts can trigger the recruitment of cognitive control. To quantify individual differences in this pattern, residual scores were calculated as in Study 1. These scores were highly correlated with raw flanker costs following hostile primes (β = .85, p < .0001) and were necessarily uncorrelated with flanker costs following nonhostile primes. Finally, scores were multiplied by −1, such that higher scores would more intuitively reflect greater tendencies toward hostility-primed cognitive control.

Daily diary protocol. Following the initial assessment session, participants completed a 3-week daily diary protocol. On each day, participants were instructed to access a website between the hours of 8 p.m. and midnight to answer several questions concerning the day in question. Four measures were of particular relevance to present concerns. Descriptive statistics for all measures can be found in Table 1. First, participants reported the frequency with which they encountered five types of provocations (i.e., whether someone had criticized, ignored, embarrassed, been unfair to, or argued with the participant) on a 0 (*not a single time*) to 2 (*more than once*) scale. These items were adapted from a prior investigation of provocation in daily life (Moskowitz, 1994). Reliability for this measure was high (α = .94 across items; α = .83 across days).

Table 1
Descriptive Statistics for Daily Measures in Study 2

Statistic	Provocations	Forgiveness	Expressive suppression	Daily anger
M	0.44	0.49	3.73	1.48
SD	0.47	0.70	1.54	0.61
Minimum	0.00	0.00	1.00	1.00
Maximum	2.00	3.00	7.00	5.00
Response scale	0 to 2	0 to 3	1 to 7	1 to 5

Subsequently, participants reported on the decision to forgive. In this connection, we used a direct, face-valid measure. Participants were asked to report on the frequency (0 = *not a single time*; 3 = *more than twice*) with which they forgave someone on the day in question (α = .88 across days). Previous research indicated that when such assessments are used in close proximity to a provocation, they are valid and converge with other measures of forgiveness (McCullough et al., 2003, Study 2). Expressive suppression was assessed with two items ("I kept my anger and irritation to myself today"; "I tried not to express my anger or irritation today"; r = .87 across items; α = .92 across days) adapted from prior studies (Gross & John, 2003).

Finally, participants reported the intensity of anger experienced on the day in question. Items were drawn from the hostility scale of Watson and Clark's (1994) PANAS-X (items = angry, hostile, irritated, disgusted, loathing, scornful). Participants rated how intensely they felt each of these feelings on the day in question, on a 1 (*not at all*) to 5 (*extremely*) response format (α = .91 across items; α = .96 across days).

To ensure high quality data, the daily reports were closely screened. Occasions on which the participant completed multiple reports within the same day were discarded. After such deletions, we found that compliance with the protocol was adequate (response rate = 72.9%). Participant responses were averaged within day for all measures. To correct for skewed distributions, all measures were log-transformed. Although analyses were conducted with transformed scores, means are displayed in terms of the original unit for ease of interpretation.

Results

Analysis strategy. Hypotheses were examined with multilevel random coefficient modeling (MRCM). This analysis is ideal for daily diary studies for several reasons. First, MRCM is adept at handling randomly missing data and appropriately weights each participant according to the amount and reliability of data they provided (Nezlek, 2008). Third, MRCM also allows investigators to examine nested data structures and interactions across levels of analysis (Raudenbush & Bryk, 2002).

Analyses were conducted with HLM software (Version 6.02). Within-subject predictors were modeled at Level 1, and between-subjects predictors were modeled at Level 2. For each analysis, we first sought to determine whether there was significant between-subjects variance in the dependent measure. To do so, we estimated the unconditional model in which error terms for the dependent measure were estimated at both Level 1 and Level 2

(Nezlek, 2008; Raudenbush & Bryk, 2002). Next, within-subject predictors were added. To appropriately separate within- and between-subjects variance and maximize reliability in the calculation of within-subject slopes, we centered predictors of substantive theoretical interest on each participant's mean (Enders & Tofighi, 2007; Raudenbush & Bryk, 2002). To successfully serve as covariates, however, it was necessary to instead center within-subject control variables on the sample's grand mean (Enders & Tofighi, 2007; Raudenbush & Bryk, 2002). All within-subject slopes were initially allowed to vary randomly across participants. These slopes were subsequently fixed only when there was no evidence of random variation at even a liberal criterion for significance ($p > .10$; Nezlek, 2008).

The third and final stage of each analysis was designed to test the central, hypothesized interaction. Both the main effect of hostility-primed cognitive control and its interaction with the relevant within-subject predictor were estimated. To interpret the hypothesized interactions, means were estimated for participants high ($M + 1\ SD$) and low ($M - 1\ SD$) in hostility-primed cognitive control over the available scores for the relevant within-subject predictor, and simple slope analyses were conducted (Aiken & West, 1991; Preacher, Curran, & Bauer, 2006).

The forgiveness of provocations.

Analysis overview. Our first analysis was designed to test Hypothesis 5, which is that higher levels of hostility-primed cognitive control would promote the decision to forgive provocations AQ: 7, T2 (see Table 2 for a summary of all stages of this analysis). In this analysis, provocation, hostility-primed cognitive control, and their interaction term were entered as predictors of forgiveness.

Preliminary considerations. The unconditional model provided clear evidence of random between-subjects variation in forgiveness, AQ: 8 χ^2(, N =) = 518.06, $p < .0001$. In the second stage of the analysis, it was found that provocation was a robust, positive predictor of forgiveness on the same day ($\lambda = .29$, $p < .0001$). Moreover, there was adequate evidence of random between-subjects variation in these provocation-forgiveness slopes, χ^2(, N =) = 65.08, $p = .07$.

Test of the hypothesis. In the third and final stage of the analysis, the main effect of hostility-primed cognitive control was nonsignificant ($p = .86$). More important, though, the predicted provocation by hostility-primed cognitive control interaction was Fn3 significant ($\lambda = .18$, $p = .003$, standardized $r = .41$,[3] with a medium effect size; Cohen, 1987). The positive nature of this relationship indicates that higher levels of hostility-primed cognitive control were associated with stronger increases in forgiveness on high provocation days.

Probing the hypothesized interaction. Estimated means are F2 depicted in Figure 2A. Participants low in hostility-primed cognitive control exhibited only a modest, nonsignificant increase in forgiveness due to provocation ($\lambda = .11$, $p = .17$). However, participants high in hostility-primed cognitive control exhibited a highly significant increase in forgiveness on high provocation days ($\lambda = .47$, $p < .0001$). Thus, the first analysis confirms that hostility-primed cognitive control does promote the decision to forgive provocations.

Additional considerations. We next addressed several questions arising from the first analysis. First, we investigated whether the above results could be due to individuals high in hostility-primed cognitive control encountering differing levels of provocation. In contrast to such an explanation, hostility-primed cognitive control was unrelated to levels of provocation encountered ($\lambda = .0007$, $p = .56$). We also examined whether the above results could reflect the increased use of a wide variety of anger regulation strategies by individuals high in hostility-primed cognitive control. In contrast to such an explanation, hostility-primed cognitive control exhibited no relationship with expressive suppression in the form of either a main effect ($\lambda = .11$, $p = .33$) or an interaction with provocation ($\lambda = -.27$, $p = .73$). Finally, we tested whether the tendency of individuals high in hostility-primed cognitive control to forgive provocations was associated with an immediate decrease in anger We found neither a main effect of hostility-primed cognitive control ($\lambda = -.001$, $p = .85$) nor an interaction with provocation ($\lambda = .02$, $p = .74$) in predicting same-day anger. We now turn to the later phases of the forgiveness process, in which we would expect hostility-primed cognitive control to predict reductions in anger.

Completing the forgiveness process.

Analysis overview. Our last analysis was designed to test Hypothesis 6, which is that individuals high in hostility-primed cognitive control would more effectively reduce anger on days following the decision to forgive (see Table 3 for a summary of all T3 stages of this analysis). Forgiveness (day $j - 1$), hostility-primed cognitive control, and their interaction term were entered as predictors of daily anger (day j). Daily anger (day $j - 1$) was also entered as a control variable, so that residual variance represented change in anger across subsequent days.

Preliminary considerations. The unconditional model indicated that there was significant between-subjects variation in daily anger levels, χ^2(, N =) = 409.84, $p < .0001$. In the second stage of the analysis, it was found that anger (day $j - 1$) was a significant predictor of anger (day j; $\lambda = .18$, $p = .001$), but there was no indication that this pattern varied randomly across participants ($p > .50$). Forgiveness (day $j - 1$) tended to result in lower anger levels (day j), but this relationship was not significant at the normative level ($\lambda = -.02$, $p = .41$). However, there was evidence of robust individual differences in the forgiveness-anger relationship, χ^2(, N =) = 65.76, $p = .003$. Thus, it is possible that some individuals exhibit a significant relationship between forgiveness and subsequent reductions in anger.

Test of the hypothesis. In the final stage of this analysis, the main effect of hostility-primed cognitive control was not significant ($p > .9$). Of greater importance, however, was the hypothesized hostility-primed ~~Cognitive Control × Prior Forgiveness~~ interaction, which was significant ($\lambda = -.08$, $p = .002$, standardized $r = -.44$, with a medium effect size; Cohen, 1987). The inverse nature of this relationship indicates that higher levels of hostility-primed cognitive control were associated with stronger decreases in anger following the decision to forgive.

Probing the hypothesized interaction. Estimated means for the hypothesized interaction are depicted in Figure 2B. Participants high in hostility-primed cognitive control showed a highly signif-

[3] The standardized effect size r was calculated with the formula provided by Hunter and Schmidt (1990): $r = t/(t^2 + n - 2)^{1/2}$. This formula has been used to provide effect size estimates in several prior MRCM investigations (e.g., McCullough et al., 2003).

Table 2
Summary of Multilevel Model Predicting Daily Forgiveness in Study 2

	Unconditional model			Level 1 predictors entered			Level 2 predictors entered		
Measure	Coefficient	*SE*	Variance component	Coefficient	*SE*	Variance component	Coefficient	*SE*	Variance component
Fixed effects									
Intercept, λ_{00}	.135***	.016		.135***	.016		.135***	.016	
HPCC, λ_{01}	—	—		—	—		−.003	.016	
Provocation, λ_{10}	—	—		.285***	.063		.291***	.057	
Provocation × HPCC, λ_{11}	—	—		—	—		.181**	.057	
Random effects									
Forgiveness (intercept), r_0			.012***			.012***			.012***
Provocation–forgiveness slopes, r_1			—			.049*			.021
Residual, *e*			.019			.018			.018

Note. HPCC = hostility-primed cognitive control.
* $p < .10$. ** $p < .01$. *** $p < .0001$.

icant decrease in anger due to prior forgiveness ($\lambda = -.09$, $p = .005$). By contrast, individuals low in hostility-primed cognitive control showed no such pattern, ($\lambda = .05$, $p = .09$). In sum, it appears that hostility-primed cognitive control not only promotes the decision to forgive but also leads people to be subsequently more effective at leaving behind anger.

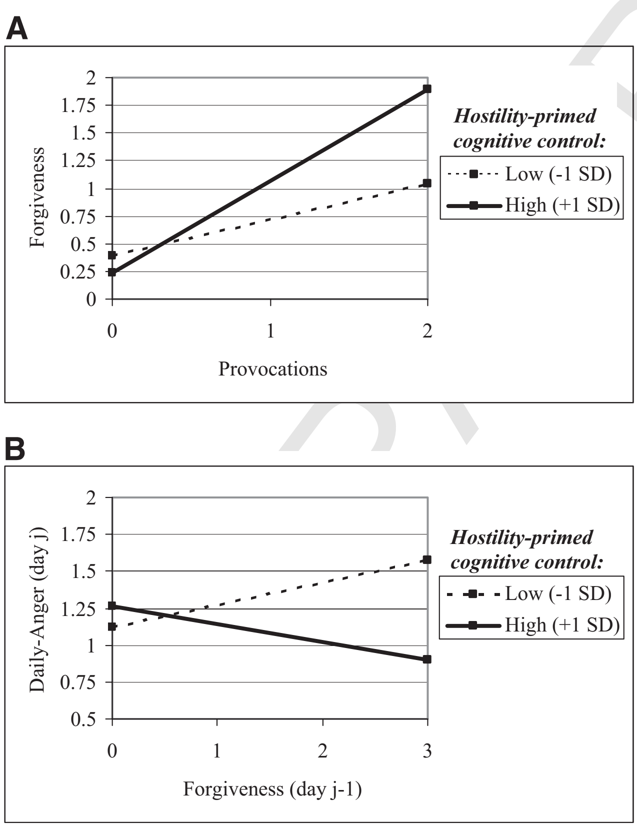


Figure 2. A: Forgiveness as a function of hostility-primed cognitive control and provocation in Study 2. B: Daily anger as a function of hostility-primed cognitive control and prior forgiveness in Study 2.

General Discussion

Summary of Hypotheses and Results

It is quite clear that cognitive control is involved in the regulation of anger and aggression (see Wilkowski & Robinson, 2008a, ~~in press~~, for recent reviews). Nonetheless, the emotion regulation operations underlying this relationship have remained relatively unexplored. Drawing on conflict monitoring theory (Botvinick et al., 2001; Botvinick, Cohen, & Carter, 2004), we put forward three critical proposals. First, we suggested that it is essential to explore whether a person recruits and uses cognitive control resources within hostile situations and not simply look at whether a person exhibit cognitive control abilities under emotionally neutral, baseline conditions. Second, we suggested that because of the conflicting goals that arise in hostile situations (i.e., toward revenge and relationship maintenance), some individuals are more likely to recruit cognitive control resources in this context (Wilkowski & Robinson, 2008b). Third, we suggested that this should allow these individuals to more effectively forgive their provocateurs, ultimately resulting in decreased aggression and anger.

Two studies were conducted to test these predictions. Across all studies, hostility-primed cognitive control was assessed implicitly with a primed flanker task. In Study 1, we investigated how hostility-primed cognitive control impacted the earliest aspects of the forgiveness process. To do so, a laboratory provocation was administered and participants' ensuing response was recorded. Consistent with predictions, participants high in hostility-primed cognitive control were less likely to retaliate aggressively, and this was particularly true when the opportunity for forgiveness was greater. It is perhaps more important that lower levels of revenge motivation mediated this effect. In sum, Study 1 supported the position that forgiveness is a critical emotion regulation operation underlying the cognitive control of aggression.

We next predicted that individuals high in hostility-primed cognitive control would exhibit decreases in anger at later stages of the forgiveness process. As a test of this prediction, participants in Study 2 completed a daily diary survey in which they reported on

Table 3
Summary of Multilevel Model Predicting State Anger in Study 2

Measure	Unconditional model			Level 1 predictors entered			Level 2 predictors entered		
	Coefficient	*SE*	Variance component	Coefficient	*SE*	Variance component	Coefficient	*SE*	Variance component
Fixed effects									
Intercept, λ_{00}	.083***	.008		.077***	.006		.077***	.006	
HPCC, λ_{01}	—	—		—	—		−.0003	.006	
Forgive (day j − 1), λ_{10}	—	—		−.022	.026		−.020	.022	
Forgiveness × HPCC, λ_{11}	—	—		—	—		−.076**	.022	
State anger (day j − 1), λ_{20}	—	—		.180***	.049		.194***	.049	
Random effects									
Anger (intercept), r_0			.003***			.001***			.001***
Forgiveness–anger slopes, r_1			—			.008**			.003*
Anger (day j − 1) − Anger (day j) slopes, r_1			—			.028			—
Residual, e			.005			.005			.005

Note. HPCC = hostility-primed cognitive control.
* $p < .10$. ** $p < .01$. *** $p < .0001$.

provocations occurring in daily life as well as their ensuing response. Consistent with predictions, participants high in hostility-primed cognitive control were more likely to decide to forgive provocations. Moreover, they were more likely to exhibit decreases in anger following the decision to forgive. In sum, the results of two studies demonstrate that forgiveness is critical in linking hostility-primed cognitive control to lower levels of aggression and anger.

A Broader View of Cognitive Control and Anger Regulation

Both cognitive control and anger regulation are multifaceted constructs. Cognitive neuropsychologists (e.g., Botvinick et al., 2004; Nee, Wager, & Jonides, 2004) have argued that top-down control can be exerted at a number of stages of information processing, including selective attention, cognitive representation, response selection, and response execution. In a strikingly similar vein, emotions researchers (Gross & Thompson, 2007) have suggested that anger can be altered at a number of stages of processing. One can withdraw attention from hostile events (Bushman, 2002), reappraise a prior provocation (Zillmann & Cantor, 1976), inhibit revenge motivation (McCullough et al., 2003), or suppress the external expression of anger (DeWall et al., 2007).

In the current investigation, we concentrated on one of the most frequently used measures of cognitive control, the resolution of flanker interference (Botvinick et al., 2001; Rueda et al., 2004). On the basis of research suggesting that flanker interference is due to conflict at the response selection phase (Botvinick et al., 2001; Coles, Gratton, Bashore, Eriksen, & Donchin, 1985), we predicted that the superior resolution of flanker interference in hostile contexts would allow individuals to better execute a forgiveness process involving the inhibition of revenge motivation. The evidence supported this position and provided discriminant validity showing that this measure did not predict the alternative emotion regulation technique of expressive suppression.

We would like to propose that these findings reflect a broader matching principle, whereby cognitive control processes encourage a corresponding anger regulation process. According to this principle, tasks assessing top-down control over selective attention (e.g., the antisaccade task; Everling & Fischer, 1998) would predict tendencies to distract one's self from hostile information. Likewise, tasks assessing top-down control over cognitive representations (e.g., memory suppression; Anderson & Green, 2001) or response execution (e.g., stop-signal; Logan, Schachar, & Tannock, 1997) would predict tendencies toward reappraisal and expressive suppression, respectively. We believe that this matching principle represents a critical insight in explaining how cognitive control reduces anger and aggression.

Broader Implications for Self-Regulatory Success and Failure

Mischel and colleagues (e.g., Mischel & Shoda, 2005) have long argued for a social cognitive and contextual view of personality, suggesting that individual differences are best conceptualized as if–then contingencies. The present results can be viewed as consistent with such an approach. Hostility-primed cognitive control was defined in terms of a tendency to recruit cognitive control resources in hostile contexts, and it proved to be quite productive in explaining individual differences in anger, aggression, and forgiveness.

Within the self-control literature, the dominant view has been that self-control success has a direct relationship with domain-general self-control abilities (Baumeister et al., 1994). There are now enough caveats to this theory that it no longer appears to be generally applicable (Robinson, Schmeichel, & Inzlicht, in press), at least not in the manner originally envisioned (Baumeister et al., 1994). In the present context, it was not the case that anger, aggression, and forgiveness were a function of cognitive control abilities per se. They were a function of the individual's tendencies to recruit cognitive control resources in hostile contexts specifically.

Such findings point to the broader applicability of a cognitive control recruitment framework to other self-regulatory domains. From this perspective, an individual's tendencies to recruit cognitive control resources following exposure to various types of temptations (e.g., alcohol or food) should predict their ability to self-regulate in that domain (i.e., alcohol abstinence or dieting). In sum, we suggest that self-regulatory success may be a function of whether the individual recruits and uses cognitive control resources in a specific self-regulatory domain.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Thousand Oaks, CA: Sage.

Anderson, M. C., & Green, C. (2001). Suppressing unwanted memories by executive control. *Nature, 410,* 366–369.

Bargh, J. A., & Chartrand, T. L. (2000). The mind in the middle: A practical guide to priming and automaticity research. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 253–285). New York, NY: Cambridge University Press.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182.

Bartholow, B. D., Anderson, C. A., Carnagey, N. L., & Benjamin, A. J., Jr. (2005). Interactive effects of life experience and situational cues on aggression: The weapons priming effect in hunters and nonhunters. *Journal of Experimental Social Psychology, 41,* 48–60.

Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation.* San Diego, CA: Academic Press.

Berkowitz, L. (1993). *Aggression: Its causes, consequences, and control.* New York, NY: McGraw Hill.

Botvinick, M. M., Braver, T. S., Barch, D. M., Carter, C. S., & Cohen, J. D. (2001). Conflict monitoring and cognitive control. *Psychological Review, 108,* 624–652.

Botvinick, M. M., Cohen, J. D., & Carter, C. S. (2004). Conflict monitoring and anterior cingulate cortex: An update. *Trends in Cognitive Sciences, 8,* 539–546.

Botvinick, M. M., Nystrom, L. E., Fissell, K., Carter, C. S., & Cohen, J. D. (1999). Conflict monitoring versus selection-for-action in anterior cingulate cortex. *Nature, 402,* 179–181.

Bushman, B. J. (2002). Does venting anger feed or extinguish the flame? Catharsis, rumination, distraction, anger, and aggressive responding. *Personality and Social Psychology Bulletin, 28,* 724–731.

Bushman, B. J., & Anderson, C. A. (1998). Methodology in the study of aggression: Integrating experimental and nonexperimental findings. In R. G. Geen & E. Donnerstein (Eds.), *Human aggression: Theories, research, and implications for social policy* (pp. 23–48). San Diego, CA: Academic Press.

Cohen, J. (1987). *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: Erlbaum.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.

Coles, M. G. H., Gratton, G., Bashore, T. R., Eriksen, C. W., & Donchin, E. (1985). A psychophysiological investigation of the continuous flow model of human information processing. *Journal of Experimental Psychology: Human Perception and Performance, 11,* 529–553.

de Waal, F. B. M. (2000, July 28). Primates: A natural heritage of conflict resolution. *Science, 289,* 586–590.

DeWall, C. N., Baumeister, R. F., Stillman, T., & Gailliot, M. T. (2007). Violence restrained: Effects of self-regulation and its depletion on aggression. *Journal of Experimental Social Psychology, 43,* 62–76.

Eisenberg, N., Smith, C. L., Sadovsky, A., & Spinrad, T. L. (2004). Effortful control: Relations with emotion regulation, adjustment, and socialization in childhood. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 259–282). New York, NY: Guilford.

Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12,* 121–138.

Eriksen, B. A., & Eriksen, C. W. (1974). Effects of noise letters upon the identification of a target letter in a nonsearch task. *Perception and Psychophysics, 16,* 143–149.

Everling, S., & Fischer, B. (1998). The antisaccade task: A review of basic research and clinical studies. *Neuropsychologia, 36,* 885–899.

Fincham, F. D., Hall, J., & Beach, S. R. H. (2006). Forgiveness in marriage: Current status and future directions. *Family Relations, 55,* 415–427.

Finkel, E. J., & Campbell, W. K. (2001). Self-control and accommodation in close relationships: An interdependence analysis. *Journal of Personality and Social Psychology, 81,* 263–277.

Finkel, E. J., Rusbult, C. E., Kumashiro, M., & Hannon, P. A. (2002). Dealing with betrayal in close relationships: Does commitment promote forgiveness? *Journal of Personality and Social Psychology, 82,* 956–974.

Fischer, A. H., & Roseman, I. J. (2007). Beat them or ban them: The characteristic and social functions of anger and contempt. *Journal of Personality and Social Psychology, 93,* 103–115.

Freud, S. (1955). *Beyond the pleasure principle.* London, England: Hogarth Press. (Original work published 1920)

Gratton, G., Coles, M. G. H., & Donchin, E. (1992). Optimizing the use of information: Strategic control of activation of responses. *Journal of Experimental Psychology: General, 121,* 480–506.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85,* 348–362.

Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3–24). New York, NY: Guilford Press.

Hunter, J. E., & Schmidt, F. L. (1990). *Methods of meta-analysis: Correcting error and bias in research findings.* Newbury Park, CA: Sage.

Karremans, J. C., & van Lange, P. A. M. (2004). Back to caring after being hurt: The role of forgiveness. *European Journal of Social Psychology, 34,* 207–227.

Kochanska, G., Murray, K. L., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36,* 220–232.

Logan, G. D., Schachar, R. J., & Tannock, R. (1997). Impulsivity and inhibitory control. *Psychological Science, 8,* 60–64.

Lorenz, K. (1963). *On aggression.* New York, NY: Harcourt, Brace, & World. AQ: 9

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and re-sampling methods. *Multivariate Behavioral Research, 39,* 99–128.

McCullough, M. E., Fincham, F. D., & Tsang, J. (2003). Forgiveness, forbearance, and time: The temporal unfolding of transgression-related interpersonal motivations. *Journal of Personality and Social Psychology, 84,* 540–557.

Meier, B. P., Robinson, M. D., & Wilkowski, B. M. (2006). Turning the other cheek: Agreeableness and the regulation of aggressive primes. *Psychological Science, 17,* 136–142.

Mischel, W., & Shoda, Y. (1995). A cognitive–affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review, 102,* 246–268.

Morgan, A. B., & Lilienfield, S. O. (2000). A meta-analytic review of the relation between antisocial behavior and neuropsychological measures of executive function. *Clinical Psychology Review, 20,* 113–136.

Moskowitz, D. S. (1994). Cross-situational generalizability and the interpersonal circumplex. *Journal of Personality and Social Psychology, 66,* 921–933.

Nee, D. E., Wager, T. D., & Jonides, J. (2007). Interference resolution: Insights from a meta-analysis of neuroimaging tasks. *Cognitive, Affective, and Behavioral Neuroscience, 7,* 1–17.

Neely, J. H. (1991). Semantic priming effects in visual word recognition: A selective review of current findings and theories. In D. Besner, & G. W. Humphreys (Eds.), *Basic processes in reading: Visual word recognition* (pp. 264–336). Hillsdale, NJ: Erlbaum.

Nezlek, J. B. (2008). An introduction to multilevel modeling for social and personality psychology. *Social and Personality Psychology Compass, 2,* 842–860.

Posner, M. I., & Rothbart, M. K. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology, 12,* 427–441.

Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interaction in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics, 31,* 437–448.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers, 36,* 717–731.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Robinson, M. D. (2007). Lives lived in milliseconds: Using cognitive methods in personality research. In R. W. Robins, R. C. Fraley, & R. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 345–359). New York, NY: Guilford Press.

AQ: 10 Robinson, M. D., Schmeichel, B. J., & Inzlicht, M. (in press). A cognitive control perspective on self-control strength and its depletion. *Social and Personality Psychology Compass.*

Rueda, M. R., Posner, M. I., & Rothbart, M. K. (2004). Attentional control and self-regulation. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 283–300). New York, NY: Guilford.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 18,* 643–662.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72,* 271–324.

Taylor, S. P. (1967). Aggressive behavior and physiological arousal as a function of provocation and the tendency to inhibit aggression. *Journal of Personality, 35,* 297–310.

Tipper, S. P., Borque, T. A., Anderson, S. H., & Brehaut, J. C. (1989). Mechanisms of attention: A developmental study. *Journal of Experimental Child Psychology, 48,* 353–378.

Troop-Gordon, W., & Asher, S. R. (2005). Modifications in children's goal when encountering obstacles to conflict resolution. *Child Development, 76,* 1–15.

Watson, D., & Clark, L. A. (1994). *The PANAS-X: Manual for the positive and negative affect schedule—Expanded form*. Unpublished manuscript, University of Iowa, Iowa City.

Wilkowski, B. M., & Robinson, M. D. (2008a). The cognitive basis of trait anger and reactive aggression: An integrative analysis. *Personality and Social Psychology Review, 12,* 3–28.

Wilkowski, B. M., & Robinson, M. D. (2008b). Guarding against hostile thoughts: Trait anger and the recruitment of cognitive control. *Emotion, 8,* 578–583.

Wilkowski, B. M., & Robinson, M. D. ~~(in press).~~ The anatomy of anger: An integrative cognitive model of trait anger and reactive aggression. *Journal of Personality*. AQ: 11

Witvliet, C. V. O., Ludwig, T. E., & Laan, K. L. V. (2001). Granting forgiveness or harboring grudges: Implications for emotion, physiology, and health. *Psychological Science, 12,* 117–123.

Yovetich, N. A., & Rusbult, C. E. (1994). Accommodative behavior in close relationships: Exploring transformation of motivation. *Journal of Experimental Social Psychology, 30,* 138–164.

Zillmann, D., & Cantor, J. R. (1976). Effect of timing of information about mitigating circumstances on emotional responses to provocation and retaliatory behavior. *Journal of Experimental Social Psychology, 12,* 38–55.

Received June 17, 2009
Revision received October 30, 2009
Accepted January 20, 2010 ■

AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES 1

AQ1: Author: Please provide a complete reference to support the citation to Lorenz (1966). Should the year in the citation be 1963 instead?

AQ2: Author: Does the slash in "clinical/forensic" indicate "and" "or" or "and/or"?

AQ3: Author: Does the slash in "social/personality" indicate "and" "or" or "and/or"?

AQ4: Author: What is the df for $t = 2.40$?

AQ5: Author: Is there a version number or URL for SONA Internet software?

AQ6: Author: Can HLM be spelled out?

AQ7: Author: What is the significance of the dashes that appear in some of the cells in Tables 2 and 3?

AQ8: Author: Please provide a df and an N for $\chi^2() = 518.06$, $\chi^2() = 65.08$, $\chi^2() = 409.84$, and $\chi^2() = 65.76$

AQ9: Author: Please indicate where in the text Lorenz (1963) should be cited or indicate that it is okay to delete the reference.

AQ10: Author: Any update on the publication status of Robinson, Schmeichel, & Inzlicht (in press)?

AQ11: Author: Any update on the publication status of Wilkowski & Robinson (in press)?

AQ12: Author: Are all authors in the Department of Psychology at their respective institutions?