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Unconscious Influences on Judicial Decision-Making: The Illusion of Objectivity

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Unconscious Influences on Judicial Decision-Making: The Illusion of Objectivity*

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> *"The more one sees of human fate and the more one examines its secret springs of action, the more one is impressed by the strength of unconscious motives and by the limitations of free choice."*
>
> —Carl Gustave Jung[1]

Most people, especially members of the judiciary, strive to make decisions that are correct, fair, ethical, and that are free from the influence of biases and prejudices. For members of the judiciary, the very notion of impartial decision-making is codified in the Judicial Code of Conduct.[2] It is in the very nature of

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* "The Illusion of Objectivity" is a phrase attributable to Yale Assistant Professor David A. Armor. YALE.EDU, Department of Psychology Faculty Information, http://www.yale.edu/psychology/FacInfo/Armor.html (last visited June 23, 2010).

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1. Although Jung's concept of the unconscious as a psychoanalytic notion might be decidedly different from modern concepts of unconscious thinking, this statement demonstrates how timeless are the notions of unconscious and implicit influences on human thought process.

2. *See* MODEL CODE OF JUD. CONDUCT Canon 2 (2007); MODEL CODE OF JUD. CONDUCT Canon 3 (2004).

being a judge to be an impartial and unbiased arbiter of the cases presented to the court for disposition. Most judges expend significant energy and thought consciously avoiding personal biases and prejudices in the decision-making process.

When considering biases and prejudices that influence decision-making, what most readily comes to mind is *conscious* bias and prejudice. But in recent years the subject of implicit bias—unconscious or subconscious influences on decision-making—has reemerged in a variety of psychological and social science venues and has potentially significant ramifications in judicial decision-making.[3] This Article introduces the concept of implicit bias in useful terms and then points the reader to deeper and more nuanced discussions of the subject and its ramifications across the social science spectrum. This Article will then consider some aspects of implicit bias' role in judicial decision-making, both in terms of quick, heat-of-trial decisions (known as "blinking") and in terms of carefully considered and weighed decisions (known as "staring"). Finally, this Article proposes some avenues of thought for future consideration about implicit bias' potential influences and possible steps toward minimizing whatever harmful effects it might have on judicial decision-making.

I. INTRODUCTION TO IMPLICIT BIAS

The concept of implicit bias is based on the science of implicit cognition, which "suggests that actors do not always have conscious, intentional control over the processes of social perception, impression formation, and judgment that motivate their actions."[4] Rather, there are many implicit mental processes that function outside of one's conscious attentional focus, including implicit memories, implicit perceptions, implicit attitudes, and implicit stereotypes.[5] In this setting, the term "bias" need not have a pejorative connotation, as it more accurately "denotes a displacement of [one's] responses along a continuum of

3. *See* Project Implicit, http://projectimplicit.net/media.php (last visited May 15, 2010) (on file with the *McGeorge Law Review*) (listing links to various journal and newspaper articles, videos, and broadcasts related to the work done in this area); *see generally Study Points to Emergency Room Bias Against Blacks* (NPR radio broadcast July 26, 2007), *available at* http://www.npr.org/templates/story/story.php?storyId=12253244 (on file with the *McGeorge Law Review*) (discussing a study of prejudicial bias in hospital emergency rooms); Alexander Green et al., *Implicit Bias Among Physicians and its Prediction of Thrombolysis Decisions for Black and White Patients*, 22 J. GEN. INTERNAL MED. 1231 (suggesting that racial bias affects the treatment that many African-American patients receive in hospital emergency rooms); Alan Schwarz, *Study of N.B.A. Sees Racial Bias in Calling Fouls*, N.Y. TIMES, May 2, 2007, at A1 (studying racial bias in foul calls during basketball games).

4. Anthony G. Greenwald & Linda Hamilton Krieger, *Implicit Bias: Scientific Foundations*, 94 CAL. L. REV. 945, 946 (2006).

5. *Id.* at 947.

possible judgments."[6] Indeed, "biases can [just as readily] be either favorable or unfavorable."[7]

Implicit biases are unconscious mental processes based on implicit attitudes or implicit stereotypes which play an often unnoticed role in day to day decision-making.[8] Implicit biases are rooted in the fundamental mechanics of the human thought process, where people learn at an early age to associate items that commonly go together and to logically expect them to inevitably co-exist in other settings: "thunder and rain, for instance, or gray hair and old age."[9] Implicit biases can be particularly problematic in judicial decision-making because "they can produce behavior that diverges from a person's avowed or endorsed beliefs or principles."[10] They can be particularly challenging in the legal world, for example, because the entire concept of discrimination law is, to some degree, premised on underlying notions that "human actors are guided by their avowed . . . beliefs, attitudes, and intentions."[11]

"In the mid-1990s, Tony Greenwald, a professor of psychology at the University of Washington, developed an experimental tool called the Implicit Association Test (IAT) to study unconscious bias."[12] The test asks subjects to rapidly classify words or images displayed on a computer monitor as "good" or "bad."[13] "The IAT's general method can be adapted to measure a wide variety of the . . . group-trait associations that underlie attitudes and stereotypes."[14] Subjects taking the IAT "must make split-second 'good/bad' distinctions between words like 'love,' 'joy,' 'pain,' and 'sorrow' and at the same time [must] sort images of faces that are (depending on the bias in question) black or white, young or old, fat or thin, and so on."[15] The test purports to "expose implicit biases by detecting subtle shifts in reaction time that can occur when test takers are required to pair different sets of words and faces."[16] Test takers who believe that they do not have negative biases toward, for example, a particular race, gender, or age group, "are nevertheless likely to be slower to associate" the "good" words with those groups, than they are to associate other groups with "good" words.[17]

Greenwald, along with Mahzarin R. Banaji, a professor of social ethics in the department of psychology at Harvard University, and Brian Nosek, an associate professor in the psychology department at the University of Virginia, put the IAT

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6. *Id.* at 950.
7. *Id.* at 951.
8. *Id.*
9. Mahzarin R. Banaji et al., *How (Un)Ethical Are You?*, HARVARD BUS. REV. (Dec. 2003) at 58.
10. Greenwald & Krieger, *supra* note 4, at 951.
11. *Id.*
12. Banaji et al., *supra* note 9, at 58.
13. *Id.*
14. Greenwald & Krieger, *supra* note 4, at 952.
15. Banaji et al., *supra* note 9, at 58.
16. *Id.*
17. *Id.*

on the Internet in 1998, and since that time people from around the world have taken several million tests.[18] Those tests have confirmed "and extended the findings of more traditional laboratory experiments" and have "show[n] implicit biases to be strong and pervasive."[19] Data gathered suggests that more than seventy-five percent of test takers demonstrate some implicit biases in favor of "the young, the rich, and whites[;]" conscious desires or conscious reports against being biased do not eliminate the presence of implicit biases; "[minority group members tend to show less [significant] implicit [biases] for their own group[s] than majority group members show for theirs[;]" and "those who show higher levels of implicit bias [when taking] the IAT are also [more] likely to behave in ways" consistent with those implicit biases in face-to-face interactions.[20]

The IAT has expanded into increasingly diverse domains and applied "to a wide variety of groups [of] social categories."[21] Results of the research and analysis of the data associated with the IAT indicate that the IAT has displayed "predictive validity," meaning a significant correlation between biases suggested by test results and evaluations of actual behavior.[22] There is substantial "evidence that implicit attitudes produce discriminatory behavior" and "[t]he dominant interpretation of this evidence is that implicit attitudinal biases are especially important in influencing nondeliberate or spontaneous discriminatory behaviors."[23]

Implicit biases are unconscious attitudes and correlations that are formed by one's life experiences and that lurk beneath the surface of the conscious. Regardless of conscious and explicit desires for unbiased decision-making, these implicit biases often have very real impacts on the decisions one makes. In the last twenty years, a significant amount of research has been done on implicit bias in social sciences, and its repercussions for the legal community and judicial decision-making are now starting to come to the forefront of discussion.

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18. *Id.*; *see* Project Implicit, *supra* note 3; *see also* University of Virginia, *Psychology Department: Brian Nosek*, http://www.virginia.edu/psychology/people/detail.php?id=104 (last visited Sept. 13, 2010) (on file with the *McGeorge Law Review*) (describing Professor Nosek's work "in collaboration with Mahzarin Banaji's laboratory at Harvard and Tony Greenwald's laboratory at the University of Washington").

19. Banaji et al., *supra* note 9, at 58.

20. *Id.* at 59

21. Greenwald & Krieger, *supra* note 4, at 953-54. The explanation of what implicit bias is and the empirical results about implicit bias have been in literature for the last fifteen years. Significant breakthroughs for the law concern recent evidence on predictive validity, available at http://www.people.fas.harvard.edu~banaji. *See* Appendix A (concerning studies of the IAT and its predictive validity).

22. Greenwald & Krieger, *supra* note 4, at 954; *see also* Appendix A (documenting thirty-seven studies of the IAT and its predictive validity with "real world" subject populations).

23. Greenwald & Krieger, *supra* note 4, at 961.

II. BLINKING VS. STARING: JUDICIAL DECISION-MAKING

The process of judicial decision-making is not an easy one to narrow down and classify in easily managed pigeon-holes. Some historical studies of how judges reach their decisions categorized different approaches to judicial decision-making and approached the process of judicial decision—by way of the formalist and realist models—considering whether judges apply the law to the facts in a logical and mechanical manner through deliberative use of syllogistic reasoning (formalist), or whether judges follow an intuitive process to resolve disputes and then only later rationalize and deliberatively explain the intuitive decision (realist).[24] A more recent approach to studying judicial decision-making, however, has argued that some key insights from both formalist and realist models form a more accurate model of judicial decision-making, called the "intuitive-override" model of judging.[25] "[T]his model posits that judges generally make intuitive decisions but sometimes override their intuition with deliberation."[26]

Intuitive thought processes occur spontaneously and involve decisions that are made automatically, effortlessly, and quickly.[27] Deliberative thought processes, on the other hand, occur through controlled processing and involve decisions that are rule-governed and made slowly with great effort.[28] The relationship between intuitive thought processes and deliberative thought processes is complicated, and judicial decision-making can certainly be seen to involve both types of thought processes.[29]

One way of testing and illustrating the interplay between intuitive thought processes and deliberative thought processes is through use of the "Cognitive Reflection Test" (CRT).[30] The CRT is a three-problem test that measures the taker's ability or disposition to steadfastly resist relying on the response to a problem that first comes to mind upon a quick reading of the problem.[31] The questions in the CRT are designed to invite an immediate, intuitive response that, upon deliberation, proves to be incorrect.[32]

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24. *See* Chris Guthrie et al., *Blinking On The Bench: How Judges Decide Cases*, 93 CORNELL L. REV. 1 (2007).

25. *Id.* at 3.

26. *Id.*

27. *Id.* at 7.

28. *Id.* at 7-8.

29. *See id.* at 2-3 ("Judges surely rely on intuition, rendering a purely formalist model of judging clearly wrong, yet they also appear able to apply legal rules to facts, similarly disproving a purely realist model of judging.").

30. *Id.* at 10; Shane Frederick, *Cognitive Reflection and Decision Making*, 19 J. ECON. PERSPECT. 25, 26 (2005).

31. Guthrie et al., *supra* note 24, at 10.

32. *Id.*

The CRT in its entirety is as follows:[33]

(1)	A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?
(2)	If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?
(3)	In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

For many people the first question in the CRT invites an intuitive and immediate response of "ten cents."[34] This intuitive response, however, is incorrect; deliberation reveals that the correct answer must be five cents—the ball costs five cents, the bat costs one dollar more at $1.05, and the two together cost a total of $1.10.[35] The CRT involves problems that are easily understood when explained or deliberated over; yet reaching the correct conclusion for each of the problems often requires one to suppress an incorrect answer that impulsively seems correct immediately upon reading the question.[36] Another way of categorizing this process is to consider the quick and intuitive decisions as ones that are made in the course of "blinking" at a problem, while the slow and deliberative decisions are made in the course of "staring" at a problem.

At least one recent study of judicial decision-making supports the notion that intuitive thought processes influence judicial decisions.[37] In this sense, judges tend to perform on the CRT and engage in decision-making in ways comparable to other groups of well-educated adults, largely relying on intuition to make snap judgments, but also demonstrating an ability to use deliberation to override intuitive impressions.[38] Another study, specifically considering judges and the IAT, suggests that judges, like any other group of people, carry implicit biases based on their various life experiences and that those implicit biases can affect judges' decision-making, especially in contexts where judges are unaware of the need to take implicit biases into account in their decision-making.[39]

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33. *Id.;* Frederick, *supra* note 30, at 27.

34. Guthrie et al., *supra* note 24, at 10.

35. *Id.*

36. *Id.* at 11.

37. *See id.* at 27-28 (noting that judges tend to make intuitive judgments when "awarding damages, assessing liability based on statistical evidence, and predicting outcomes on appeal . . .").

38. *Id.* at 28.

39. Jeffrey J. Rachlinski et al., *Does Unconscious Racial Bias Affect Trial Judges?*, 84 NOTRE DAME L. REV. 1195, 1221 (2009).

What does not yet appear to have been significantly studied, in the context of judicial decision-making, is just how much implicit biases impact intuitive decisions and/or deliberative decisions. To the extent that intuitive decisions are based on quick impressions made without time to fully evaluate all potential influences and ramifications, it seems likely that implicit biases could have a significant impact on a judge's first thoughts in resolving matters presented for disposition.[40] To the extent that deliberative decisions are based on carefully weighing available options and factors, and are reached after the passage of time and careful consideration, it is not difficult to see how implicit biases might impact many aspects of judicial decision-making.[41] As such, it seems reasonable to expect that implicit biases could have a significant impact on the decisions made by judges, regardless of whether those decisions are quick and intuitive, or slow and deliberative.

Moreover, it seems likely that implicit biases can have varying levels of influence on judicial decision-making at all levels of the judicial process. Trial judges tend to more often have a need for intuitive processing of problems arising during the course of a trial that require quick answers, but they also engage in deliberative resolution of matters submitted and taken under advisement. Appellate judges tend to more often engage in deliberative resolution of issues presented for appellate review, but their decisions are still often influenced by the intuitive first impression of arguments presented in briefs and oral arguments. As such, the potential impact of implicit bias seems likely to reach across the judicial spectrum having influence on a variety of judicial decisions, whether of the "blinking" or the "staring" variety.

Judges naturally strive to reach decisions that are both correct on the merits and correct from an ethical perspective. Implicit biases can potentially impair the ability of judges to reach correct decisions from either perspective. Simply recognizing the possible influence that implicit biases can have on judicial decision-making affords judges one more opportunity to carefully consider all aspects of the decision to reach the most correct outcome from both perspectives. Recognition of implicit biases and the way in which they can impact decision-making is the first step toward seeking to eliminate whatever improper influences they might bring to the decision-making process.

III. MOVING FORWARD

If the first step is simply recognizing that implicit biases do exist and that they do influence decision-making, even in the best intentioned and most "consciously" impartial of judges, then the next step is to begin identifying potential means of limiting the impact of implicit biases. To that end, there is certainly reason to be optimistic.

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40. *See supra* text accompanying note 27.

41. *See supra* text accompanying note 28.

Research suggests that people do have the ability to compensate in order to diminish the impacts of implicit biases.[42] Among possible alternatives for facilitating this compensation are specific testing and training, exposure to stereotype-incongruent models, inducement of more effective deliberative thought processing, and increased post-decision auditing.[43] While not an exhaustive list, these measures have all been proposed and, to some extent, evaluated by scholars studying judicial decision-making, implicit biases, and intuitive and deliberative thought processes.

A first possible effort to minimize or counteract implicit biases is to specifically test and train judicial decision-makers about their implicit biases.[44] Testing for implicit biases might help judges better understand their own potential implicit biases and the extent to which those biases might influence their decisions.[45] Training about implicit biases in general, how they most likely influence judicial decision-making and how their impact can be minimized, could become an important first aspect of the ever-growing world of judicial education.[46] Because there are, to a large extent, significant judicial education programs in virtually every jurisdiction of the country, there is an existing infrastructure in which to incorporate implicit bias testing and training.[47] The National Center for State Courts is currently undertaking a National Campaign to Ensure the Racial and Ethnic Fairness of America's State Courts, which is directed in part, at judicial education concerning implicit bias.[48]

The concept of stereotype-incongruent modeling has been proposed by a number of scholars as a viable means of reducing the presence and impact of

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42. Rachlinski et al., *supra* note 39, at 1202.

43. *Id.* at 1226; Guthrie et al., *supra* note 24, at 35.

44. Rachlinski et al., *supra* note 39, at 1227; *see also* Green, et al., *supra* note 3, at 1237 (suggesting tests for physicians).

45. Rachlinski et al., *supra* note 39, at 1228.

46. *Id.* For some examples of training materials available online see LearningDiversity.com, Online Vignette Exercises for Racial Diversity Training, http://www.learningdiversity.com/pocvig1.htm (last visited May 15, 2010) (on file with the *McGeorge Law Review*) (providing short stories for diversity training); UnderstandingPrejudice.org, http://www.understandingprejudice.org/orgs/ (last visited May 15, 2010) (on file with the *McGeorge Law Review*) (providing educational resources and information on prejudice, discrimination, multiculturalism, and diversity).

47. Phase II of The National Campaign to Ensure the Racial and Ethnic Fairness of America's State Courts (developing national resources and provide technical assistance on implicit bias) began in Chicago Illinois, on May 18, 2010. The attendees included judges, attorneys, and other professionals with knowledge and expertise in the area of implicit bias, including Judge Irwin. The purpose of the meeting was to white board potential strategies and tactics to lessen the influence of implicit bias in the courts. The National Center for State Courts opines that much of the existing literature concerning implicit bias is not, for the most part, particularly effective for judges or is somewhat vague in terms of implementation in a courtroom setting. *See* NCSConline.org, http://www.ncsconline.org/D_Research/ref/ (last visited May 15, 2010) (on file with the *McGeorge Law Review*) (discussing two phases of The National Campaign to Ensure the Racial and Ethnic Fairness of America's State Courts).

48. *Id.* Another possible aspect of judicial education might involve the use of objectivity cards distributed at judicial education seminars. *See* Appendix B (giving examples of objectivity cards).

implicit biases.[49] Stereotype-incongruent modeling involves taking affirmative steps to expose decision-makers to situations and examples that specifically contradict the impressions most suggested by their implicit biases.[50] For example, if a particular decision-maker has an implicit bias that prompts an unfavorable impression or response toward a particular race, increased exposure to positive examples of that race might work to diminish or counteract the negative implicit biases toward that race.[51] If a judge's sentencing decisions suggest a negative implicit bias toward black defendants, affirmative steps to expose the judge to more positive black role models, such as colleagues, could have a positive effect on the impact of the implicit biases.[52] Once an individual judge's implicit biases are identified, comparable stereotype-incongruent modeling scenarios could be proposed.

Because some research concerning the CRT suggests that increased deliberative thought processing can correct initial mistakes in intuitive judgments, it is possible that inducing more deliberative thought processing will provide some benefit to counteract the influence of implicit biases on intuitive judgments.[53] While not an exhaustive list of possible steps, more effective deliberation could be increased through steps to expand the amount of time judges have to make decisions, steps to alter the frequency with which judges need to issue written decisions explaining the rationale supporting the decision, and taking steps to reallocate decision-making between judges and juries or utilizing more multi-judge panels.[54] Each of these steps would foster the opportunity for more deliberative thought processing as a means of evaluating or reducing reliance on intuitive judgments.

Finally, a system of post-decision auditing could be useful.[55] Judicial decisions could be reviewed by a diverse group of auditors to look for signs of implicit biases' influences.[56] Jurisdictions could adopt a sort of peer-review process to evaluate decisions for effective impartiality and provide feedback.[57] Even without utilizing diverse auditors or peer-review programs, providing judges with statistical data and breakdowns concerning past decisions will allow an individual assessment of trends and influences of implicit biases.[58]

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49. Rachlinski et al., *supra* note 39, at 1226-27; *see also* Jerry Kang & Mahzarin R. Banaji, *Fair Measures: A Behavioral Realist Revision of "Affirmative Action,"* 94 CAL. L. REV. 1063, 1112 (2006) (noting that diversity "help[s] 'break down racial stereotypes.'").

50. Kang & Banaji, *supra* note 49, at 1105.

51. *Id.*

52. *Id. But see* Rachlinski et al., *supra* note 39, at 1226-27 ("Our results, however, also raise questions about the effectiveness of this [stereotype-incongruent modeling] proposal.").

53. *See* Guthrie et al., *supra* note 24, at 28 (noting that judges can overcome their intuitive reactions).

54. *Id.* at 33-40.

55. Rachlinski et al., *supra* note 39, at 1230.

56. *Id.*; Guthrie et al., *supra* note 24, at 39.

57. Guthrie et al, *supra* note 24, at 39.

58. *See id.* ("If peer-review process is infeasible, courts could at a minimum record and provide judges with outcome on data on relevant decisions—for example, whether a defendant released on bail actually

IV. CONCLUSION

It is human nature to desire and believe that we act free of prejudices and biases. For judges, it is also a matter of professional identity to be impartial arbiters of problems presented for resolution. Few would admit to making consciously biased decisions, especially ones motivated by negative biases. But the human mind is a complex mechanism, and research strongly suggests that regardless of conscious or avowed biases and prejudices, most people, no matter how well educated or personally committed to impartiality, harbor some unconscious or implicit biases.[59] The degree of those implicit biases as well as their impact on either intuitive or deliberative decisions is certainly subject to debate, and likely fluctuates greatly from person to person. Nonetheless, those biases exist.

If knowledge is power, simply recognizing the prevalence of implicit bias and being open to the possibility that it is influencing our decision-making should be the first step toward empowerment. Once acknowledged and thoughtfully considered, the impacts of implicit biases can hopefully be reduced through a variety of actions.[60] The effectiveness of steps to reduce or eliminate implicit biases' effects on judicial decision-making has yet to be thoroughly studied. But this topic—implicit bias and its role on the judiciary—is a topic on the horizon and is likely to become an area of significant discussion and study in the very near future. John Erskine, in the Introduction to *American Character and Other Essays*, provided the following comment on his own essay *The Moral Obligation to be Intelligent*:

> [T]o be as intelligent as we can is a moral obligation . . . intelligence is one of the talents for the use of which we shall be called to account . . . if we haven't exhausted every opportunity to know whether what we are doing is right, it will be no excuse for us to say that we meant well.[61]

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appeared for trial. Armed with this feedback, judges might be better able to learn what they are doing well and what they are doing poorly.").

59. *See supra* notes 19-20 and accompanying text.

60. *See supra* notes 44-58 and accompanying text.

61. JOHN ERSKINE, AMERICAN CHARACTER AND OTHER ESSAYS vii-viii (1927).

Appendix A: National Center for State Courts Campaign[62]

IAT Studies Showing Validity with "Real-World" Subject Populations

VOTER BEHAVIOR

Among undecided voters assessed one month before a local Italian election IAT measures of implicit political attitudes successfully predicted subsequent voting behavior.

Arcuri, L., Castelli, L., Galdi, S., Zogmaister, C. & Amadori, A. (2008). Predicting the vote: Implicit attitudes as predictors of the future behavior of the decided and undecided voters. *Political Psychology, 29*, 369–387.

An IAT measure predicted future shift in judgments about desirability of enlarging a U.S. military base in Vicenza, Italy, for 129 residents who initially reported themselves as undecided.

Galdi, S., Arcuri, L., & Gawronski, B. (2008). Automatic mental associations predict future choices of undecided decision-makers. *Science, 321*, 1100–1102.

Votes by self-reported undecided voters in a representative sample of Italian voters (the ITANES survey) were predicted by their IAT measures of liberal–conservative ideology.

Roccato, M., & Zogmaister, C. (2010). Can we improve electoral forecasts using the IAT? A field research. *Political Psychology, 31*, 249-274.

IAT-measured White race preference, assessed in the last week before the U.S. 2008 Presidential Election, significantly predicted intention to vote for John McCain, and did so independently of political conservatism.

Greenwald, A. G., Smith, C. T., Sriram, N., Bar-Anan, Y., & Nosek, B. A. (2009). Race attitude measures predicted vote in the 2008 U. S. Presidential Election. *Analyses of Social Issues and Public Policy, 9*, 241-253.

A natural experiment of random assignment of gender quotas for leadership positions on Indian village councils showed that presence of women leaders reduced IAT-measured stereotypes that associate male more than female with leadership.

Beaman, L., Chattopadhyay, R., Duflo E., Pande, R., & Topalova, P. (2009). Powerful women: Does exposure reduce bias? *Quarterly Journal of Economics, 124*, 1497–1540.

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62. To view this compilation of references to IAT predictive results in a large variety of real-world populations online see http://faculty.washington.edu/agg/pdf/37.Real-world_samples.21May2010.pdf (last visited July 10, 2010).

MENTAL HEALTH

A suicide-ideation IAT differentiated among adolescents who were nonsuicidal, suicide ideators and suicide attempters.

Nock, M. K., & Banaji, M. R. (2007). Prediction of suicide ideation and attempts among adolescents using a brief performance-based test. *Journal of Consulting and Clinical Psychology, 75*, 707–715.

A self-injury IAT differentiated non-self-injuring from self-injuring adolescents and improved the prediction of self-injury beyond that achieved with demographic and psychiatric predictors.

Nock, M. K., & Banaji, M. R. (2007). Assessment of self-injurious thoughts using a behavioral test . *American Journal of Psychiatry, 164*, 820–823.

An IAT measure of association of self with death distinguished suicide attempters from other psychiatric emergency room patients and also predicted suicide attempts by these patients in the following six months.

Nock, M. K., Park. J. L., Finn. C. T., Deliberto, T. L., Dour, H. J., & Banaji, M. R. (in press). Measuring the "suicidal mind": Implicit cognition predicts suicidal behavior. *Psychological Science.*

An IAT measure of phobic reactions to spiders differentiated spider-phobics from controls and showed reduction in phobic associations following exposure therapy.

Teachman, B., & Woody, S. (2003). Automatic processing in spider phobia: Implicit fear associations over the course of treatment. *Journal of Abnormal Psychology, 112,* 100– 109.

In a sample of patients meeting DSM-IV criteria for panic disorder, an IAT measure of panic- related associations predicted severity of panic symptoms, agoraphobic avoidance, and distress in response to panic stressor

Teachman, B. A., Smith-Janik, S. B., & Saporito, J. (2007). Information processing biases and panic disorder: Relationships among cognitive and symptom measures. *Behaviour Research and Therapy, 45*, 1791–1811.

In a sample of persons diagnosed with panic disorder, change in a panic IAT over the course of a 12-week treatment predicted subsequent change in panic symptoms.

Teachman, B. A., Marker, C. D., & Smith-Janik, S. B. (in press). Automatic associations and panic disorder: Trajectories of change over the course of treatment. *Journal of Consulting and Clinical Psychology.*

An IAT measure of self–shame association significantly distinguished a sample of 60 women meeting diagnostic criteria for borderline personality disorder (BPD) from a comparison sample of healthy women (N = 60).

Rüsch, N., Lieb, K., Göttler, I., Hermann, C., Schramm, E., Richter, H., Jacob, G. A., Corrigan, P. W., & Bohus, M. (2007). Shame and implicit self-concept in women with borderline personality disorder. *American Journal of Psychiatry, 164*, 500–508.

In a sample of women who met diagnostic criteria for borderline personality disorder (BPD), an IAT measure of self–anxiety association significantly distinguished 23 diagnosed with comorbid posttraumatic stress disorder (PTSD) from the comparison group (N=37) not diagnosed with comorbid PTSD.

Rüsch, N., Corrigan, P. W., Bohus, M., Kühler, T., Jacob, G. A., & Lieb, K. (2007). The impact of posttraumatic stress disorder on dysfunctional implicit and explicit emotions among women with borderline personality disorder. *Journal of Nervous and Mental Disease, 195*, 537-539.

Patients (N=75) being treated for mental illness completed a Brief IAT measure of association of mental illness with shame. Those with stronger shame associations to mental illness also believed that discrimination against the mentally ill was more justified.

Rüsch, N., Todd, A. R., Bodenhausen, G. V., Olschewski, M., & Corrigan, P. W. (2010). Automatically activated shame reactions and perceived legitimacy of discrimination: A longitudinal study among people with mental illness. *Journal of Behavior Therapy and Experimental Psychiatry, 41*, 60–63.

Among mental health professionals judging clinical vignettes, stronger IAT-measured negative associations with "mentally ill people" predicted over-pathologizing (diagnosing mental illness for which no symptoms were present).

Peris, T. S., Teachman, B. A., & Nosek, B. A. (2008). Implicit and explicit stigma of mental illness: Links to clinical care. *Journal of Nervous and Mental Disease, 196*, 752-760.

A study of 2,329 Dutch patients (aged 18–65) with depression and anxiety disorders establishes that IAT-measured self-depressive associations and self-anxious associations predicted these disorders differentially and independently of parallel explicit (self-reported) measures.

Glashouwer, K., & de Jong, P.J. (in press). Disorder-specific automatic self-associations in anxiety and depression: Results of the Netherlands Study of Depression and Anxiety. *Psychological Medicine.*

In the study of 2,329 Dutch patients, IAT depression and anxiety measures significantly correlated with suicidal ideation and past suicide attempt;

interactions between the IAT measures and parallel explicit beliefs explained criterion variance beyond that explained by the explicit measures.

Glashouwer, K.A., de Jong, P.J., Penninx, B.W.J.H., Kerkhof, A.J.F.M., van Dyck, R., & Ormel, J., (in press). Do automatic self-associations relate to suicidal ideation? *Journal of Psychopathology and Behavioral Assessment.*

MEDICAL

ER and general internal medicine resident physicians' implicit bias against Black patients predicted fewer recommendations for thrombolysis for Black than White myocardial infarction patients.

Green, A.R., Carney, D.R., Pallin, D.J., Ngo, L.H., Raymond, K.L., Iezzoni, L.I., & Banaji, M.R. (2007). The presence of implicit bias in physicians and its prediction of thrombolysis decisions for black and white patients. *Journal of General Internal Medicine. 22*, 1231– 1238.

The laboratory of Reinout Wiers in Netherlands has produced numerous results showing the use of IAT measures in understanding adolescents at risk to develop serious alcohol and other drug problems. Here are a few references to this large body of work.

Thush, C., Wiers, R. W., Ames, S. L., Grenard, J. L., Sussman, S., & Stacy, A. W. (2007). Apples and oranges? Comparing indirect measures of alcohol-related cognition predicting alcohol use in at-risk adolescents . *Psychology of Addictive Behaviors, 21*, 587–591.

Wiers, R. W., Houben, K., & de Kraker, J. (2007). Implicit cocaine associations in active cocaine users and controls . *Addictive Behaviors, 32*, 1284–1289.

Thush, C., & Wiers, R. W. (2007). Explicit and implicit alcohol-related cognitions and the prediction of future drinking in adolescents. *Addictive Behaviors, 32*, 1367–1383.

Wiers, R. W., Van Woerden, N., Smulders, F. T. Y., & de Jong, P. J. (2002). Implicit and explicit alcohol-related cognitions in heavy and light drinkers . *Journal of Abnormal Psychology, 111*, 648–658.

An IAT measure of attitudes of 5th-grade children toward smoking showed variations as a function of parental smoking, and was responsive to effects of tobacco-prevention activities.

Andrews, J. A., Hampson, S. E., Greenwald, A. G., Gordon, J,, & Widdop, C. (in press). Using the Implicit Association Test to assess children's implicit attitudes toward smoking. *Journal of Applied Social Psychology.*

An IAT measure of physicians' implicit race bias, in combination with a measure of their self- reported bias, predicted patients' satisfaction with the patient–physician interaction.

Penner, L. A., Dovidio, J. F., West, T. V., Gaertner, S. L., Albrecht, T. L., Dailey, R. K., & Markova, T. (2010). Aversive racism and medical interactions with Black patients: A field study. *Journal of Experimental Social Psychology, 46,* 436-440.

A sample of medical doctors selected from a larger group of persons who completed Black— White race IATs on the Internet, showed an implicit preference for White Americans relative to Black Americans.

Sabin, J. A., Nosek, B. A., Greenwald, A. G., & Rivara, F. P. (2009). Physicians' implicit and explicit attitudes about race by MD race, ethnicity and gender. *Journal of Health Care for the Poor and Underserved, 20,* 896–913.

EMPLOYMENT & JOB PERFORMANCE

IAT correlated with hiring managers' ethnic bias in inviting Swedish vs. Arab–Muslim job applicants for hiring inteviews.

Rooth, D-O. (2010). Automatic associations and discrimination in hiring: Real world evidence. *Labour Economics,* in press.

An IAT measure of implicit bias against injecting drug users (IDUs) predicted intention to change jobs of nurses working with IDUs.

von Hippel, W., Brener, L., & von Hippel, C. (2008). Implicit prejudice toward injecting drug users predicts intentions to change jobs among drug and alcohol nurses. *Psychological Science, 19,* 7–11.

An IAT measure of Australian pilots' attraction toward risk-taking behavior (e.g., low- altitude flight) was the best predictor of their engaging in risky behavior in a flight simulator test.

Molesworth, B. R. C., & Chang, B. (2009). Predicting pilots' risk-taking behavior through an Implicit Association Test. *Human Factors, 51,* 845–857.

DEVELOPMENT & EDUCATION

Nation-level aggregate IAT measures of a gender–science stereotype predicted nations' sex differences in 8th-grade science and mathematics achievement, supporting the possibility of a causal role of the stereotypes in creating the sex differences.

Nosek, B. A., Smyth, F. L., Sriram, N., Lindner, N. M., Devos, T., Ayala, A., Bar-Anan, Y., Bergh, R., Cai, H., Gonsalkorale, K., Kesebir, S., Maliszewski, N., Neto, F., Olli, E., Park, J., Schnabel, K., Shiomura,

K., Tulbure, B., Wiers, R. W., Somogyi, M., Akrami, N., Ekehammar, B., Vianello, M., Banaji, M. R., & Greenwald, A. G. (2009). National differences in gender- science stereotypes predict national sex differences in science and math achievement. *Proceedings of the National Academy of Sciences*, in press.

Mothers' (but not fathers') IAT-measured Black–White race preference predicted racial preferences of their 3-to-6-year-old children, but parents' self-reported race attitudes did not predict their children's preferences.

Castelli, L., Zogmaister, C., & Tomelleri, S. (2009). The transmission of racial attitudes within the family. *Developmental Psychology, 45*, 586-591.

A study of 247 children in 1st through 5th grades showed that, as early as 2nd grade, IAT measures showed the American cultural stereotype that math is more for boys than girls.

Cvencek, D., Meltzoff, A, N., & Greenwald, A. G. (2010, in press). Math–gender stereotypes in elementary-school children. *Child Development.*

FORENSICS

Among sex offenders (N=46) living in a halfway house, those rated as in danger of relapse by their therapists, and those rated to be exclusively pedophile, showed greater child-erotic association than did their contrast groups.

Steffens, M. C., Yundina, E., & Panning, M. (2008). Automatic associations with "erotic" in child sexual offenders: Identifying those in danger of reoffence. *Sexual Offender Treatment, 3*, Issue 2 [Online].

An IAT measure revealed that pedophiles have an association between children and sex, whereas nonpedophilic offenders have an association between adults and sex.

Gray, N.S., Brown, A.S., MacCulloch, M.J., Smith, J., Snowden, R.J. (2005). An implicit test of the associations between children and sex in pedophiles. *Journal of Abnormal Psychology, 114, 304–308.*

The IAT method successfully distinguished truth-tellers from criminal liars, including drug users, traffic offenders, and murderers.

Sartori, G., Agosta, S., Zogmaister, C., Ferrara, S. D., & Castiello, U. (2008). How to accurately assess autobiographical events. *Psychological Science, 19*, 781–788.

In a small sample (N=14) "when a doping substance was detected in the hair of an athlete who denied doping use, their self-report . . . negative attitude . . . contrasted sharply with a more positive estimate of their implicit doping attitude."

Petróczi, A., Aidman, E. V., Hussain, I., Deshmukh, N., Nepusz, T., Uvacsek, M., Tóth, M., Barker, J., & Naughton, D. P. (2010) Virtue or pretense? Looking behind self-declared innocence in doping. *PLoS ONE*, *5*, e10457.doi:10.1371/journal.pone.0010457

RELATIONSHIPS

An IAT variant (GNAT) measure of romantic attraction successfully predicted the resistance to breakup of committed relationships.

Lee, S., Rogge, R. D., & Reis, H. T. (2009). Assessing the seeds of relationship decay: Using implicit evaluations to detect the early stages of disillusionment. *Psychological Science*, in press.

In an experience sampling study of gays, lesbians, and bisexuals (N=31), an IAT measure of anti-gay implicit attitudes predicted greater rumination, emotion suppression, and psychological distress in response to stigma-related stressors.

Hatzenbuehler, M. L., Dovidio, J. F., Nolen-Hoeksema, S., & Phills, C. E. (2009). An implicit measure of anti-gay attitudes: Prospective associations with emotion regulation strategies and psychological distress. *Journal of Experimental Social Psychology*, *45*, 1316–1320.

Appendix B: Sample Judicial Education Objectivity Cards