Using Implicit Measures in Attitude and Personality Research

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Booth School of Business

SPSP 2012 GSC and Training Committee Innovative Methods pre-conference

Overview

I. What are implicit measures useful for?
II. Conceptual approaches to the use of implicit measures
III. The Implicit Measurement Zoo: Which procedure to pick?
IV. Resources
1) What are implicit measures useful for?

Aspects of attitudes and traits that are difficult to assess via self-report due to

- Introspective limits
- Self-presentational concerns

The Idea behind Implicit Measurement

e.g., implicit stereotypes, Implicit prejudice Implicit self-esteem ...

Mental Associations

Thinking, Feeling, Behavior
Implicit Measurement

De Houwer & Moors, 2010

Link to Dual-System Theories

System 1
Associative Processing

System 2
Propositional Reasoning

- Slow, deliberate, rule-based
- Judgments, decisions, intentions
- Reasoned, planned behavior

- Fast, intuitive, habitual response generation
- Schemas and scripts
- Basic affective and motivational orientations

Example: Implicit Gender Stereotypes

• Are hiring decisions and salary offers influenced by implicit gender stereotypes?

• Procedure: Implicit Association Test (IAT) (Greenwald, McGhee, & Schwartz, 1998, *JPSP*)

• Demonstration (not included in this slideshow): Clear the desk in front of you and prepare to tap on your desk

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The Traditional IAT
(Greenwald et al., 1998)

<table>
<thead>
<tr>
<th>Block</th>
<th>N trials</th>
<th>Task</th>
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<td>Reversed target discrimination</td>
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<td>FEMALE</td>
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<td>Reversed combined block (t)</td>
<td>MALE, Career</td>
<td>FEMALE, family</td>
</tr>
</tbody>
</table>

Note. p = originally denoted “practice” block; t = “test” block
FEMALE MALE
Career Family Left Right
„Incompatible“ Block

MALE FEMALE
Career Family Left Right
„Compatible“ Block

Difficult & slow

easy & fast

Difference → IAT Effect

IAT Effect

For a more sophisticated scoring algorithm (D-Score), see Greenwald et al., 2003, *JPSP*
Some Variations of Implicit Constructs (as measured with the IAT procedure)

**Social Attitudes, Group Research**

<table>
<thead>
<tr>
<th>YOUNG</th>
<th>ELDERLY</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>bad</td>
<td>Career</td>
<td>Family</td>
</tr>
<tr>
<td>Implicit Prejudice</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Consumer, Health, Self-Regulation, Political etc.**

<table>
<thead>
<tr>
<th>COKE</th>
<th>PEPSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>bad</td>
</tr>
<tr>
<td>Brand Attitudes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Al Gore</th>
<th>Bush</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>bad</td>
</tr>
<tr>
<td>Political Attitudes</td>
<td></td>
</tr>
</tbody>
</table>

**Self-Esteem, Personality Self-Concept**

<table>
<thead>
<tr>
<th>ME</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>bad</td>
</tr>
<tr>
<td>Implicit Self-Esteem</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ME</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>angry</td>
<td>calm</td>
</tr>
<tr>
<td>Implicit Self-Concept</td>
<td></td>
</tr>
</tbody>
</table>

II. Conceptual Approaches

- **Implicit Measure as Outcome (DV)**
  - Universal attitudes
  - Known groups approach
  - Experimental manipulations
  - Method-specific effects

- **Implicit Measure as Predictor (IV)**
  - Relation between Implicit and Explicit Cognition
  - Behavior Prediction
Conceptual Approaches

Implicit Measure as DV
- Universal attitudes
- Known groups approach
- Experimental manipulations
- Method-specific effects

Research Example
- Greenwald et al., 1998, JPSP

Research Example
- Snowden et al., 2003, Archives of Sexual Behavior
Conceptual Approaches

Implicit Measure as DV
- Universal attitudes
- Known groups approach
- **Experimental manipulations/Interventions**
- Method-specific effects

Research Examples
- Olson & Fazio, 2001, *Psych Science*
- Hollands et al., 2001, *Health Psych*
- Wittenbrink et al., 2001, *JPSP*

![Graph showing Implicit Attitude](image)

Conceptual Approaches

Implicit Measure as DV
- Universal attitudes
- Known groups approach
- **Experimental manipulations/Interventions**
- Method-specific effects

Research Examples
- Mierke & Klauer, 2003, *JPSP*
- Rothermund & Wentura, 2004, *JEP:G*
- Bluemke & Friese, 2006, *JESP*

![Diagram showing Cognitive abilities](image)

**Variance Decomposition**
- method-specific variance
- construct-related variance
- error variance

Cognitive abilities
- Stimulus Salience
- Stimulus Selection
- Strategies (e.g., faking)

Measurement Process
Conceptual Approaches

Implicit Measure as “IV”
- Relation between Implicit and Explicit Cognition
- Behavior Prediction

Research Examples
- Brown & Ryan, 2003, *JPSP*
- Ranganath et al., 2005, *JESP*
- Hofmann et al., 2005, *PSPB*
- Gawronski et al., 2007, *JESP*
- Koole et al., 2001, *JPSP*

![Diagram of Implicit-Explicit Correlation]

<table>
<thead>
<tr>
<th>Explicit Self-Esteem</th>
</tr>
</thead>
<tbody>
<tr>
<td>No time pressure</td>
</tr>
<tr>
<td>Time pressure</td>
</tr>
<tr>
<td>Low implicit self-esteem</td>
</tr>
<tr>
<td>High implicit self-esteem</td>
</tr>
</tbody>
</table>

Koole et al., 2001

Conceptual Approaches

Implicit Measure as “IV”
- Relation between Implicit and Explicit Cognition
- Behavior Prediction

Research Examples
- Dunton & Fazio, 1997, *PSPB*
- Nier, 2005, *GPIR*
- Payne et al., 2005, *JPSP*
- ...

![Diagram of Implicit-Explicit Correlation]

<table>
<thead>
<tr>
<th>Explicit Attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>High concern with acting prejudiced</td>
</tr>
<tr>
<td>Low concern with acting prejudiced</td>
</tr>
<tr>
<td>Low AMP score</td>
</tr>
<tr>
<td>High AMP score</td>
</tr>
</tbody>
</table>

Payne et al., 2005
**Conceptual Approaches**

More complex cases of 
**Implicit & Explicit Attitude Change**

→ APE-Model

- **Implicit Measure as IV**
  - Relation between Implicit and Explicit Cognition
  - **Behavior Prediction**

**Incremental Validity Approach**

- **Research Examples**
  - Egloff & Schmukle, 2002, *JPSP*
  - Payne et al., 2008, *Cog. & Emo.*
  - Back et al., 2009, *JPSP*
  - Greenwald et al., 2009, *JPSP* (meta-analysis)
Conceptual Approaches

**Implicit Measure as IV**
- Relation between Implicit and Explicit Cognition
- Behavior Prediction

**Research Examples**
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**Incremental Validity**

![Graph showing incremental validity](image)

**Conceptual Approaches**

**Implicit Measure as IV**
- Relation between Implicit and Explicit Cognition
- Behavior Prediction

**Research Examples**
- Dovidio et al., 1997, *JPSP*
- Asendorpf et al., 2001, *JPSP*

**Double-Dissociation Model**

![Diagram of double-dissociation model](image)

Asendorpf et al., 2005
Conceptual Approaches

Implicit Measure as IV
- Relation between Implicit and Explicit Cognition
- Behavior Prediction

Moderated Predictive Validity

Research Examples
- Hofmann et al., 2007, JESP
- Conner et al., 2007, PSPB
- Friese et al., 2008, ERSP (review)

Conceptual Approaches

Implicit Measure as IV
- Relation between Implicit and Explicit Cognition
- Behavior Prediction

Moderated Predictive Validity

Research Examples
- Hofmann et al., 2007, JESP
- Conner et al., 2007, PSPB
- Friese et al., 2008, ERSP (review)
Conceptual Approaches

More complex case: **Implicit-Explicit Consistency as IV**

Research Examples

**Attitudes:**
- Brinol et al., 2006, *JPSP*

**Self-esteem:**
- Jordan et al., 2003, *JPSP*
- Zeigler-Hill, 2006, *JPSP*

**Intelligence self-concept:**
- Dislich et al., 2012, *EJP*

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**Hot and under-researched avenues**

- **Correspondence between different implicit procedures** (e.g., Bosson et al., 2000, *JPSP*; Gawronski & Bodenhausen, 2005, *JPSP*)
- **Development and long-term change of implicit constructs** (e.g., Dunham, Baron, & Banaji, 2008, *TiCS*)
- **Neural and physiological correlates** (e.g., Cunningham et al., 2003, *JPSP*)
- **Process-dissociation approaches** (Conrey et al., 2005, *JPSP*)
- **Extensions to new applied areas** such as law, politics, clinical & health, etc. → Era of Application
### III. The Implicit Measurement Zoo

- **Priming and related measures**
  - Sequential Conceptual Priming (LDT)
  - Sequential Evaluative Priming (EP)
  - Affect Misattribution Procedure (AMP)
- **IAT and variants**
  - Implicit Association Test (IAT)
  - Single-Category IAT (SC-IAT)
  - Brief Implicit Association Test (BIAT)
  - Recoding Free IAT (IAT-RF)
  - Single-Block IAT (SB-IAT)
  - Go/No-Go Association Task (GNAT)
- **Extrinsic Affective Simon Task (EAST)**
- **Approach-Avoidance Measures**
  - Approach-Avoidance Task (AAT)
  - Implicit Association Procedure (IAP)
  - Evaluative Movement Assessment (EMA)
  - Stimulus Response Compatibility Task (SRCT); “Manikin-Task”
- **Paper and Pencil Measures**
  - Name-Letter Task (NLT)
  - Linguistic Intergroup Bias (LIB)
  - Breadth-based Adjective Rating Task (BART)
  - Stereotypic Explanatory Bias (SEB)
  - Paper & Pencil IAT

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### The Implicit Measurement Zoo: Which procedure to pick?

- Depends a lot on what you want to measure & on your constraints
  - Does it make theoretical sense to include an implicit measure in your research?
  - Is focus on experimental manipulations/mean differences (“I as DV”) or on correlational/predictive research (“I as IV”)?
    - issue of reliability
  - Does the procedure allow you to appropriately represent the construct you are interested in?
    - e.g., absolute vs. relative comparison
  - Computer-based or paper & pencil?
  - Time constraints?
    - are briefer options available?
Selected Procedures: Pros and Cons

• Priming
  – Concept Priming and Evaluative Priming
  – Affect Misattribution Procedure (AMP)

• Traditional Implicit Association Test
  – Some problems with the traditional IAT and their suggested solutions
    • Single-Category IAT
    • Personalized IAT
    • Single-Block IAT

Sequential Concept Priming
(e.g., Banaji & Hardin, 1996; Wittenbrink et al., 1997)
Sequential Concept Priming

Supposed mechanism: spreading activation in associative semantic network

Stereotyping index

\[
\text{Stereotyping index} = \frac{(RT(\text{male} | \text{family}) - RT(\text{male} | \text{career}) + RT(\text{female} | \text{career}) - RT(\text{female} | \text{family}))}{2}
\]

(For further details on different scoring indices, see Wittenbrink, 2007)
Evaluative Priming
(e.g., Fazio et al., 1986; 1995)

Main difference between concept and evaluative priming:
Affective decision instead of lexical decision (→ response competition)

(For further details on priming measures, see Wentura & Degner, 2010; Wittenbrink, 2007)

Sequential Priming: Pros and Cons

Pros
• very unobtrusive
• optional subliminal prime presentation
• allows both absolute and relative comparisons

Cons
• time-intensive
• complicated (especially with regard to indices)
• relatively small effects
• very low reliability → not very suitable for correlational research (implicit as IV)

→ Good alternative to evaluative priming: AMP
Affect Misattribution Procedure (AMP) (Payne, Cheng, Govorun, Stewart, 2005, *JPS*P)

Affect Misattribution Procedure

[Diagram of experiment setup]
Affect Misattribution Procedure

Supposed Mechanism: misattribution of activated affect to judgment of ambivalent target

DV = percentage positive responses to target stimuli when preceded by prime of interest

AMP: Pros and Cons

Pros
- easy to implement
- allows both absolute and relative comparisons
- good reliability. Suitable for correlational research (“implicit as IV”)
- promising findings regarding incremental validity

Cons
- mechanism not well understood yet
- sometimes very large overlap with explicit measures (possibly more “explicit” than other implicit measures)
The Traditional IAT
(Greenwald et al., 1998)

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Note. p = originally denoted “practice” block; t = “test” block

The traditional IAT: Pros and Cons

**Pros**
- high reliability (both internal consistency and retest)
- ease of administration
- very well-researched
- clear indication of incremental validity

**Cons**
- relative comparison measure
- various sources of unwanted method-specific variance identified
Some IAT Problems and Suggested Remedies

<table>
<thead>
<tr>
<th>Problem</th>
<th>D-Score Algorithm</th>
<th>Single Category IAT</th>
<th>Personalized IAT</th>
<th>Single Block IAT</th>
</tr>
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<tbody>
<tr>
<td>Cognitive Skill Confounds</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Order Effects</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Relative Comparison</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra-personal Associations</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Recoding Strategies</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
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D-Score Algorithm

(Greenwald et al., 2003, JPSP)

Substantially reduces:
- Cognitive ability confounds (e.g., task-switching; Klauer & Mierke, 2003)
- Compatibility order effects (compatible block first produces larger IAT scores than vice versa)

<table>
<thead>
<tr>
<th>TABLE 3.3. Summary of IAT Scoring Procedures Recommended by Greenwald et al. (2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Delete trials greater than 10,000 msec</td>
</tr>
<tr>
<td>2. Delete subjects for whom more than 10% of trials have latency less than 300 msec</td>
</tr>
<tr>
<td>3. Compute the “inclusive” standard deviation for all trials in Stages 3 and 6 and like-wise for all trials in Stages 4 and 7</td>
</tr>
<tr>
<td>4. Compute the mean latency for responses for each of Stages 3, 4, 6, and 7</td>
</tr>
<tr>
<td>5. Compute the two mean differences (Mean_{Stage 6} − Mean_{Stage 3} and (Mean_{Stage 7} − Mean_{Stage 4})</td>
</tr>
<tr>
<td>6. Divide each difference score by its associated “inclusive” standard deviation</td>
</tr>
<tr>
<td>7. $D = \text{the equal-weight average of the two resulting ratios}$</td>
</tr>
</tbody>
</table>

SPSS and SAS scripts available at: [http://faculty.washington.edu/agg/iat_materials.htm](http://faculty.washington.edu/agg/iat_materials.htm)
Single-Category IAT
(Karpinski & Steinman, 2006, *JPSP*)

Addressed Problem: relative nature of IAT
- Hard to know what specific association drives an IAT effect
- Sometimes a suitable comparison part is lacking

Solution: only one Target Category, balancing of number of trials

<table>
<thead>
<tr>
<th>SPIDER</th>
<th>SPIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>negative</td>
<td>positive</td>
</tr>
</tbody>
</table>

“compatible” block

<table>
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</tr>
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<tbody>
<tr>
<td>negative</td>
</tr>
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“incompatible” block

---

Personalized IAT
(Olson & Fazio, 2004, *JPSP*)

Addressed Problem: is IAT influenced by extra-personal associations?

Solution (Olson & Fazio, 2004):
- exchange “positive” and “negative” attribute category labels with more personalized ones (“I like”; “I dislike”)

<table>
<thead>
<tr>
<th>Candy-bars</th>
<th>Apples</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I like”</td>
<td>“I dislike”</td>
</tr>
</tbody>
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“compatible” block

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<th>Candy-bars</th>
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<td>“I like”</td>
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“incompatible” block

---

For further discussions, see Nosek & Hansen, 2008, *EJPA*; Gawronski et al., 2008, *SPPC*
Single-Block IAT
(Teige-Mocigemba et al., 2008, EJPA)

Eliminates block structure of the IAT:
• thus, no compatibility order effects
• reduces cognitive skill confounds
• disables participant recoding strategies

Outlook:
Process Dissociation Approaches

• No implicit measure is process-pure
• Process Dissociation (PD) approaches separate multiple processes that determine responses (e.g., error rates in the IAT)
    automatic and controlled process
  – QUAD model (Conrey et al., 2005; Sherman et al., 2008) - 4 parameters:
    Automatic Activation, Stimulus Discrimination, Overriding Bias, Guessing

• For more information, see

Tutorial etc.: http://psychology.ucdavis.edu/labs/sherman/site/research.html
IV. Resources

• Hardware
• Programming Software
  – Inquisit
  – DirectRT
  – Eprime
• Project Implicit®
• Recommended Books and Hands-On Chapters

Hardware and Software

• Hardware:
  any modern computer will do

• Software
  – Inquisit (Millisecond): http://www.millisecond.com
  – DirectRT (Empirisoft): http://www.empirisoft.com
  – Eprime (Psychology Software Tools, Inc.):
    http://www.pstnet.com/eprime
  – FreeIAT:
    http://www4.ncsu.edu/~awmeade/FreeIAT/FreeIAT.htm
Project Implicit®
(www.https://implicit.harvard.edu)

- IAT demonstrations
- Background information

Resources: Books on Implicit Measures

Handbook of implicit social cognition: Measurement, theory, and applications
Bertram Gawronski, & Keith Payne (Eds.)

Implicit Measures of Attitudes
Bernd Wittenbrink & Norbert Schwarz (Eds.)

Attitudes: Insights from the new implicit measures
Richard Petty, Russell Fazio, & Pablo Briñol (Eds.)
Practical Hands-On Chapters

IAT (and its variants)

Priming and AMP

Paper and Pencil