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Measure what you are trying to predict: Applying the correspondence principle to the Implicit Association Test☆,☆☆

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ABSTRACT

The Implicit Association Test (IAT) is nearly synonymous with the implicit attitude construct. At the same time, correlations between the IAT and criterion measures are often remarkably low. Developed within research using explicit measures of attitudes, the *correspondence principle* posits that measures should better predict criteria when there is a match in terms of the level of generality or specificity at which both are conceptualized (Ajzen & Fishbein, 1977). As such, weak implicit-criterion correlations are to be expected when broad general implicit measures are used to predict highly specific criteria. Research using explicit measures of attitudes consistently supports the correspondence principle, but conceptual correspondence is rarely considered by researchers using implicit measures to predict behavior and other relevant criterion measures. In five experiments (total $N = 4650$), we provide the first direct evidence demonstrating the relevance of the correspondence principle to the predictive validity of the IAT and Single-Target IAT. That said, it is not the case that the IAT *always* predicts criteria better when correspondence is high. Inconsistency across the pattern of results suggests there is much more that remains to be understood about the relevance of the correspondence principle to the implicit-criterion relationship. Taken together, however, our findings suggest that conceptual correspondence often increases (and never decreases) the magnitude of implicit-criterion and implicit-explicit relationships. We provide a framework for future research necessary to establish when correspondence is more likely to increase the predictive validity of measures such as the IAT.

Attitudes are presumed to be a central determinant of human behavior (e.g., Ajzen, 2011; Allport, 1935). In other words, we expect attitudes to predict a wide range of relevant outcomes. Arguably, the predictive ability of attitudes would increase further if researchers devised methods to bypass measurement error resulting from reliance on self-report measures of attitudes (e.g., concerns with self-presentation and lack of introspective access). Beginning > 30 years ago with the publication of a measure of affective priming (Fazio, Sanbonmatsu, Powell, & Kardes, 1986), a class of measurement procedures termed "implicit" measures have long promised to do just that. Indeed, there was some hope that the priming measure might act as a "bona fide pipeline" to attitudes (Fazio, Jackson, Dunton, & Williams, 1995). Optimism about the usefulness of implicit measures only intensified with the subsequent publication of the Implicit Association Test (IAT: Greenwald, McGhee, & Schwartz, 1998), a measure that has since dominated the literature on implicit attitudes due, at least in part, to its relatively strong psychometric properties (Bar-Anan & Nosek, 2014). Meta-analyses of the IAT's predictive validity, however, have consistently found rather weak statistical relationships between implicit measures and criterion measures (Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Kurdi et al., 2019; Oswald, Mitchell, Blanton, Jaccard, & Tetlock, 2013).

That said, we have been down this road before. Controversy about the predictive validity of attitude measures is not new and it is not unique to implicit measures. Half a century ago, Wicker (1969) sparked a crisis among attitude researchers with his comprehensive review of studies demonstrating inconsistent and weak relationships between attitudes and behaviors. Although some researchers were ready to declare the death of the attitude construct as a useful predictor of behavior, others were motivated to better understand what factors explained the observed inconsistencies between attitudes and behaviors (Kelman, 1974). In the decades following Wicker's review, researchers identified

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several important methodological and conceptual moderators of the relationship between attitudes and behaviors (see Ajzen & Fishbein, 2005). One of the most important theoretical advances made during this time was the development of the *correspondence principle*, which posits that the magnitude of correlations between attitudes and behaviors depends on the extent to which they correspond in terms of their generality vs. specificity (Ajzen & Fishbein, 1977).

Ajzen and Fishbein noted that in many studies finding weak attitude-criterion relationships, researchers attempted to predict a single specific behavior (e.g., support for a tax on plastic bottles) from a broad and general attitude (e.g., attitudes toward the environment). Although general attitudes should be able to predict behaviors that are measured at a similarly general level, it is unreasonable to expect broad general attitudes toward a target to excel at predicting any single specific behavior related to the attitude object. They may do so, but they are unlikely to do so *well*. To predict a specific behavior well, attitudes must be measured at a similarly specific level. Indeed, whereas there tend to be weak correlations between general self-reported attitudes and specific behaviors, there are relatively large correlations between specific behaviors and highly correspondent explicit attitudes (Kraus, 1995).

In sum, although the relationship between attitudes and behaviors has historically been contentious, the correspondence principle allowed researchers to address many of the concerns and maximize their ability to use attitudes to predict behaviors and other relevant outcomes. Despite this, the importance of the correspondence principle continues to be under-appreciated by attitude researchers (Ajzen, 2011).

1. Conceptual correspondence and implicit measures

In the context of implicit attitudes, a few prominent researchers have recently recognized the theoretical relevance of conceptual correspondence (Blanton, Burrows, & Jaccard, 2016; Gawronski, 2019; Gawronski & Brannon, 2017; Jaccard & Blanton, 2007; Jost, 2019; Kurdi et al., 2019). Nevertheless, the correspondence principle has been investigated almost exclusively within meta-analyses of implicit-criterion relationships. Further, meta-analytic findings are mixed, dependent on idiosyncratic methodological and analytical decisions, and reliant on existing studies that tend to be both underpowered and of variable quality (Greenwald et al., 2009; Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005; Kurdi et al., 2019; Oswald et al., 2013). Clear agreement exists that the extant research examining implicit-criterion relationships failed to adequately consider the correspondence principle. For example, Oswald et al. (2013) noted that correspondence was so uniformly low in the existing literature that it could not be included as a meta-analytic moderator at all. Additionally, both Gawronski (2019) and Jost (2019) argue that the widespread use of non-correspondent implicit and criterion measures has likely led to systematic meta-analytic underestimations of the magnitude of implicit-criterion correlations.

Despite the consensus regarding its importance, direct empirical tests of the correspondence principle using implicit measures are almost non-existent (for exceptions see Blanton et al., 2016; Payne, Burkley, & Stokes, 2008). Complementing meta-analytic conclusions by systematically testing the influence of conceptual correspondence on the magnitude of implicit-criterion correlations is more than overdue. In three sets of experiments, we tested the following key predictions about the influence of target correspondence on implicit measures' abilities to predict relevant criterion measures.

H1. A specific criterion will be better predicted by a specific IAT than by a general IAT (between-subjects).

H2. A specific IAT will predict a specific criterion better than a general criterion (within-subjects).

H3. A general criterion will be better predicted by a general IAT than by a specific IAT (between-subjects).

H4. A general IAT will predict a general criterion better than a specific criterion (within-subjects).

Notably, two parallel sets of hypotheses ask related questions about the correspondence principle in a slightly different way. Namely, H1 and H3 ask the question of whether a single outcome is better predicted by one of two different IATs. In comparison, H2 and H4 ask whether an individual IAT better predicts one of two different outcomes. Results from each of these four hypotheses hold value in terms of understanding how evaluations eventuate in behavior, in contextualizing and qualifying each set of results, and providing a more complete test of the correspondence principle as it applies to implicit-criterion relationships. Further, unexpected asymmetric findings between the parallel sets of hypotheses may have theoretical and methodological implications.

2. Peripheral aims of the current experiments

We designed our experiments primarily to test a simple (or single) association pattern of predictions (see Perugini, Richetin, & Zogmaister, 2010) because our goal was to test the relationship between implicit measures and criterion measures. There are other considerations, however, such as how strongly implicit measures relate to explicit attitudes, and whether they predict criteria above and beyond explicit measures (i.e., incremental validity). Although these additional concerns were not our central focus, we did measure some form of explicit attitudes in most experiments. As such, we report exploratory analyses incorporating explicit attitudes to test 1) the influence of correspondence on implicit-explicit relationships and 2) issues related to incremental validity.

Insofar as it is possible with our data, we present exploratory results from two different applications of the correspondence principle to incremental validity. The first approach is to test whether the IAT predicts unique variance in criteria above and beyond one explicit measure that corresponds highly with the content of the IAT (e.g., Kurdi et al., 2019). The second approach is to test whether the IAT predicts unique variance above and beyond any available explicit attitude measures that correspond in any way with either the implicit or criterion measure (Blanton et al., 2016).

All supplemental analyses are available at the following OSF page: https://osf.io/xehfu/.

3. Analysis plan

Although our hypotheses would most commonly be tested by comparing correlations or through moderated regression, there are several reasons why these approaches are suboptimal for the current data. The problem involves the patterns of measurement error and variances across the general and specific IATs within each experiment. Making direct comparisons across two measures with different reliabilities attenuates regression coefficients for the less reliable measure (Little, Card, Bovaird, Preacher, & Crandall, 2007). This can produce a false interaction effect or hide a true interaction effect. Unequal reliabilities are especially problematic when the variances of the predictor variable (IAT scores) across the dichotomous moderator variable (IAT type) are different (Kenny, 2015). Failure to accurately assess and account for implicit measures' reliabilities is a key issue that has remained largely unaddressed (Kurdi et al., 2019; LeBel & Paunonen, 2011). In this case, multiple groups SEM is one solution as it allows for the two regression slopes to be compared without measurement error and should thus minimize bias (e.g., Kline, 2012).

3.1. Factor loading invariance

Meaningfully comparing regression slopes in multiple groups SEM requires the factor loadings to be (reasonably) invariant across groups.