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Field-Identification IAT predicts students' academic persistence over and above Theory of Planned Behavior constructs

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Abstract

Ajzen and Dasgupta (2015) recently invited complementing Theory of Planned Behavior (TPB) measures with measures borrowed from implicit cognition research. In this study, we examined for the first time such combination, and we did so to predict academic persitence. Specifically, 169 first-year college students answered a TPB questionnaire and completed a field-identification Implicit Association Test (IAT). The IAT measure largely predicted academic persistence 6 months later over and above TPB constructs, including behavioral intention. We discuss interpretations of this finding and its relevance to educational research.

1. Introduction

Dropout in first year at university affects about 25% of students, and comes with major social, organizational and economic costs (Finnie & Qiu, 2008; National Center for Education Statistics, 2016; Organization for Economic Cooperation and Development, 2013; Schmitz & Frenay, 2013). Over the last 30 years, education research has significantly advanced our understanding of the drivers of students' persistence and drop out. Historically, researchers have focused on the socio-demographic characteristics of students (e.g., ethnicity, parent income, parent's third-level education, sex, educational background) to understand academic persistence (Otero, Rivas, & Rivera, 2007; Pascarella & Terenzini, 2005; Ratelle, Larose, Guay, & Senécal, 2005; Vermandele, Dupriez, Maroy, & Van Campenhoudt, 2012). In parallel, researchers started exploring the role of motivational variables (e.g., expectancy-value, intention, self-efficacy, control) and educational variables (e.g., institutional experiences, academic and social integration, social pressure) (Braxton, Hirschy, & McClendon, 2004; Cabrera, Castaneda, Nora, & Hengstler, 1992; Eccles & Wigfield, 2002; Nora, Cabrera, Hagdorn, & Pascallera, 1996; Pritchard & Wilson, 2003; Schmitz, Frenay, Neuville, Boudrenghien, Wertz, Noël, & Eccles, 2010; Tinto, 2006). In this context, the Theory of Planned Behavior (or TPB; Fishbein & Ajzen, 2010) was recently considered, with the aim of covering under a single theoretical umbrella the most widely studied determinants of academic persistence (Davis, Ajzen, Saunders, & Williams, 2002; Houme, 2010; Roland, Frenay, & Boudrenghien, 2016a).

In TPB research, people's behavior is thought be best predicted by their intention to perform this behavior. In turn, people's intentions are determined by their attitudes, perceived norms and perceived control. Those are all ultimately based on their beliefs that the behavior is likely to be under their control and to serve their best interests. This rational behavioral model relies on direct (i.e., self-reported) measures of TPB constructs, such as self-reported intentions (Fishbein & Ajzen, 2010). The TPB provided a very integrative understanding of academic persistence (Davis et al., 2002; Houme, 2010; Roland et al., 2016a). Recently, however, prominent TPB and implicit cognition researchers have called for studies that include both direct *and* indirect measures for predicting behavior. For instance, Ajzen and Dasgupta (2015) noted:

> *"Complementing the reasoned action approach, a great deal of research in recent years has focused on implicit cognitions and their effects on behavior. The general theorizing behind this line of work is the proposition that dormant beliefs, attitudes, intentions, and other constructs of this kind can be activated while still remaining below conscious awareness, and that these implicit reactions can have observable effects on judgments and actions"* (Ajzen & Dasgupta, 2015, p. 136)

In the present study, we examined how the latter combination between explicit and implicit cognition measures may help to better predict academic persistence. We did so by collecting both TPB constructs measures and a field-identification Implicit Association Test (IAT) measure. The IAT has been extensively used in implicit cognition research (Hofmann, Gschwendner, Nosek, & Schmitt, 2005; Rothermund & Wentura, 2004). It makes it possible to assess spontaneous associations between one's self-concept and semantic attributes (Greenwald et al., 2002). The use of an IAT has been shown to improve the prediction of behaviors in many areas (e.g., mental and physical health, employment, job performance, stereotypes), but to our knowledge it has never been used in the context of academic persistence. And, perhaps even more important, to our knowledge, the IAT and the TPB have never been jointly considered in predicting behaviors. Hence, the innovation of the current research is twofold: examining how an IAT measure contributes to predicting academic persistence, and examining the degree to which it may do so over and above more analytical (and self-reported) TPB measures. In doing so, this research also contributes to

strengthening ties between two areas of psychology that are rarely related to each other, namely educational psychology and social psychology (both in its explicit and implicit cognition dimensions).

At first sight, everything opposes the TPB and the IAT approaches, since the first involves detailed and deliberate measures that address explicit cognition processes whereas the second involves holistic and spontaneous measures thought to tackle implicit cognition processes. The use of both direct and indirect measures can, however, help better predict a variety of behaviors, such as intergroup behavior (e.g., Greenwald, Mcghee, & Schwartz, 1998; Ottaway, Hayden, & Oakes, 2001), job performance (e.g., Srivastava & Banaji, 2011), and alcohol and drug use (e.g., Chassin, Presson, Sherman, Seo, & Macy, 2008; Wiers, Van Woerden, Smulders, & de Jong, 2002). Furthermore, social behaviors characterized by relatively high levels of involvement, such as political voting (e.g., Arcuri, Catselli, Galdi, Zogmaister, & Amadori, 2008), participation in rallies (e.g., Zerhouni, Rougier, & Muller, 2016), or even suicidal behavior (e.g., Nock et al., 2010) are often best predicted when using both direct and indirect measures.

We reasoned that the predictive contribution of indirect measures could also be observed in the case of academic persistence. This is consistent with evidence suggesting that for some students vocational decisions are based on a deliberate decision-making style, while for other students the decision is more intuitive (Arroba, 1977; Gati, Landman, Davidovitch, Asulin-Peretz, & Gadassi, 2010). In fact, Gati and colleagues (2010) proposed that, for the same person, the vocational decision might be based on different decision-making styles. On the basis of these elements, it seemed important to examine the role played by more spontaneous and intuitive process in academic persistence. A field-identification IAT seems particularly suited in this regard.

2. Method

2.1 Participants

169 first-year Belgian college students in psychology agreed to participate in our research and were assured of the confidentiality of their responses. 86.4 % of the participants were female and 13.6 % were male. This ratio is representative of students in psychology at the hosting university. The mean age of the participants was 19.72 years (*SD* = 1.02). All participants were French speakers. Among these participants, 34.3 % dropped out whereas 66.7% persisted in psychology studies. Note that no observation was excluded of our sample. This sample size provided adequate statistical power ($1 - \beta = .8$) with a type I error of .05 to detect an effect size as small as Cohen's $f^2 = .046$ (which consists in a small-to-medium effect size that is suited for multiple regressions design according to Cohen (1988)).

2.2 Procedure

In April 2016, students enrolled in first year psychology -since September 2015- were asked to complete an IAT and a TPB questionnaire. Completion of both the IAT and the TPB questionnaire was confidential and participants collaborated on a voluntary basis. The study was carried out in accordance with the ethical standards of our institution. Those who agreed to participate in this research took the IAT in a computer room and completed a TPB questionnaire directly afterwards. The total duration of tasks completion was 15 minutes on average. In September 2016, with permission from both the academic authorities and the participants, we obtained information about participants' registration for the next year in their academic program (i.e., persistence measure).

2.2 Measurement

Implicit Association Test. The IAT (Greenwald et al., 1998) is a computer test based on participants' response times in classifying stimuli. It measures spontaneous associations between concepts, in this case self-concept and psychology. More specifically, the IAT consisted in 7 consecutive blocks in which participants had to quickly categorize words appearing on the screen along two dimensions by using two keys ("e" and "i"). The words used to represent the self-concept came from the literature (i.e., Nock et al., 2010; Nosek, Banaji, & Greenwald, 2002) and the words used to represent psychology were selected on the basis of a pilot study (see Table 1) (Bellezza, Greenwald, & Banaji, 1986). The pilot study was conducted on a separate sample of 159 participants who responded to a solicitation on a popular social network. Respondents came from different backgrounds (15% were professionals in various fields of psychology). The pilot study allowed selecting seven words highly associated with psychology (M = 35.63, SD = 11.76) and seven words highly associated with other professional and curricula domains (M = -38.46, SD = 12.75) ($F(1, 15) = 2762.6$, $p < .001$, $\eta^2 = .95$).

Table 1

Words used in the Implicit Association Test in French (English)

Self-related	Non-self-related	Psychology-related	Non-psychology-related
Mon (Mine)	Leur (Their)	Burnout (Burnout)	Archéologie (Archeology)
Je (I)	Il (He)	Dépression (Depression)	Comptabilité (Accounting)
Mes (Mines)	Ses (His)	Phobie (Phobia)	Sol (Ground)
Ma (Mine)	Sa (Her)	Névrose (Nevrosis)	Eprouvette (Test tube)
Mienne (Mine)	Eux (Them)	Emotion (Emotion)	Pesticide (Pesticide)
		Freud (Freud)	Bâtiment (Building)
		Thérapeute (Therapist)	Agricole (Agricultural)

In the first block, students had to categorize five words related to the self (e.g., "Me", "Mine") and five words related to others (e.g., "He", "His") by using the "e" key of the keyboard if it was self-related, and by using the "i" key if it was related to others. Participants were instructed to be as quick as possible while trying to make as few mistakes as possible. Each word was presented twice, resulting in 20 trials. In the second block, students had to categorize seven words related to psychology (e.g., "Emotion", "Therapist") with the "e" key and seven words related to other disciplines (e.g., "Accounting", "Archeology") with the "i" key in 20 trials (each word was presented at least once). In the third block and fourth blocks, both self- and psychology-related words were to be responded to with the "e" key and the non-self and non-psychology related words with the "i" key. These third and fourth "congruent" blocks consisted in 20 and in 40 trials, respectively. In a fifth block, students were asked to reverse the key mapping for the words related to psychology (by using the "i" key) or not psychology (by using the "e" key) in 20 trials. In the sixth and seventh "incongruent blocks", students had to categorize words using the "e" key both for self-related and non-psychology related words and the "I" key" for the no-self related and the psychology-related words, respectively for 20 and 40 trials. Students were randomly assigned to a condition in which congruent blocks preceded the incongruent blocks or vice-versa (reversing blocks 2, 3 and 4 with blocks 5, 6 and 7). As a result, depending on the experimental block, students had to use the same key or not to categorize the words as related to the self and to psychology. The rationale is that if they associate themselves strongly with

psychology, categorizing self-related words along with psychology-related words should be facilitated. Likewise, categorizing self-related words with non-psychology-related words using the same key should interfere (Greenwald et al., 1998 ; Hofmann et al., 2005).

The relative strength between "self" and "psychology" was computed for each participant by calculating a *D score* [-2 ; +2] (Nosek, Bar-Anan, Sriram, Axt, & Greenwald, 2014). According to Nosek and colleagues (2014), response times exceeding 10.000 ms and/or students with more than 10% of their response time below 300 ms had to be excluded from the sample. Indeed, Nosek and colleagues (2014) found that including very fast responses (<300 ms) or on the contrary slow responses (>10.000 ms.) disrupted psychometric properties enough to warrant excluding them. Based on these rules, none of the participants of this study had to be excluded from the sample. To calculate the *D score*, the average response time of the congruent blocks was subtracted from the average response time of the incongruent blocks and this score was then divided by the standard deviation of response times per participant. The *D score* thus represents the level of spontaneous identification of the self with psychology, a positive *D score* meaning a stronger association between "self" and "psychology" and a negative *D score* meaning a stronger association between "self" and "not psychology".

Persistence. To measure persistence, we used the student's registration in the same field of studies in the next academic year (Nora et al., 1996; Robbins et al., 2004). Students who continued in the same field after their first academic year were coded "1"; students who did not continue in the same field were coded "0".

To measure the constructs of the theory of planned behavior, we used scales adapted from Fishbein and Ajzen (2010). Most items on the self-report questionnaire were rated on 5-point Likert-type scales (generally with 1 = strongly disagree and 5 = strongly agree). The exceptions are presented below. Factorial analyses were performed and revealed one factor by scale, except for perceived behavioral control where three factors were found.

Intention. Students' intention to persist was assessed using three items (α = .88) ("I intend to stay registered in psychology studies next year").

Attitude. The evaluation of attitude was obtained by means of a set of evaluative semantic differential scales. The statement "Staying enrolled in psychology studies next year will be…" was rated on five bipolar adjective scales (pleasant-unpleasant; positive-negative; useful-useless; good-bad; important-not important) taken from Osgood, Suci and Tannenbaum (1957) (α = .89).

Injunctive norms. Four items were used to measure injunctive norms (α = .71). One item was "My relatives believe that I should not stay enrolled in psychology studies next year".

Descriptive norms[1]. Six items were used to assess descriptive norms concerning their father and mother (α = .77). One item was "During her studies, my mother remained enrolled in the studies she had initiated".

Perceived behavioral control. Ten items were created for assessing perceived behavioral control, following the recommendations of Fishbein and Ajzen (2010). Factorial analysis revealed three factors. The first factor was composed of four self-efficacy items (α = .85) ("I am sure that I will be able to stay enrolled in my psychology studies next year"). The second factor consisted of three items about the control a person has over the decision to drop out (α = .86) ("I will decide to enrol in new studies next year"). Finally, the third

[1] This scale, although part of the TPB, was not taken into account in all the analysis since only students with at least one graduate parent could answer this question. This therefore excluded many of the participants.

factor was about the control a person has over the decision to persist and was made up of two items (r = .75) ("I'll decide to stay enrolled in psychology next year").

3. Results

3.1 Preliminary analyses

Correlational analyses and summary statistics of each study's variables were performed (Table 2). The scores corresponding to Skewness and Kurtosis were found to be within the normal values (Hae-Young, 2013). Correlational analyses showed outcomes consistent with relationships postulated in the TPB (for more details on TPB applied to academic persistence, see Houme, 2010; Roland et al., 2016a).

It is interesting to note that the IAT was significantly correlated with persistence, and with persistence only. Performance on the IAT was compared, using a *t test* for independent samples, between students who persisted and students who gave up. Results revealed that students who persisted initially had a stronger implicit association between self and psychology (M = .82, SD = .37) than those who eventually decided to drop out six months later (M = .47, SD = .40) ($t(167) = 5.76$; $p < .001$).

Table 2

Correlations between the TPB constructs and the IAT

	M	SD	Skew.	Kurt.	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Persistence	.65	.48	-.67	-1.57	1	.41**	.19*	.07	.19**	.01	.20**	.02	.11
2. IAT	.70	.42	-.32	1.41		1	-.02	-.03	-.05	-.01	.01	-.13	-.08
3. Intention	4.68	.71	-2.52	3.4			1	.63**	.36**	-.12	.50**	.17*	-.09
4. Attitude	4.56	.49	-1.22	1.01				1	.37**	-.08	.43**	.18*	-.07
5. Injunctive norms	4.24	.68	-.91	.23					1	-.02	.33**	.13	-.04
6. Descriptive norms	4.04	1.25	-.61	-.51						1	.52	.32	.05
7.Self-efficacy beliefs	4.28	.65	-.79	-.17							1	.20**	.11
8.Control on persistence	4.85	.43	-2.48	4.01								1	.08
9.Control on dropout	3.21	1.49	-.30	-1.35									1

** = $p < .01$; * = $p < .05$

3.2 Main analyses

Of critical interest to the present research is whether the field-identification IAT would predict persistence over and above TPB measures. To this end, we ran a logistic regression analysis that regressed persistence on TPB and IAT measures (see Table 3). Logistic regression is the appropriate regression analysis to conduct when the dependent variable is dichotomous. This analysis showed that self-reported intention and the IAT measure predicted persistence in this joint model[2]. Of importance, intention was less predictive of

[2] That other constructs of TPB do not predict persistence in this model is not surprising since they are supposed to impact persistence through intention. Preliminary analyses showed that when intention is not introduced into the regression, self-efficacy predicts persistence, which is consistent with research (Barry & Finney, 2009; Vuong, Brown-Welry, & Tracs, 2010; Wright, Jenkins-Guarnieri, & Merdock, 2012). Table 1 also shows simple correlations between those constructs, intentions and persistence, which are fully consistent with TPB.

persistence than the IAT measure: the odds of persisting were much higher when the IAT score was high (*exp b* = 18.25) than when intention was high (*exp b* = 2.28).

Table 3

Logistic regression analysis predicting academic persistence

	B (SE)	**exp *b***
Constant	-5.18 (2.74)	.01
Attitude	-.88 (.52)	.42
Injunctive norms	.56 (.31)	1.74
Self-efficacy beliefs	.48 (.35)	1.62
Control on persistence	.05 (.48)	1.05
Control on dropout	-.15 (.14)	.86
Intention	.83 (.38)	2.28*
IAT	2.90 (.59)	18.25***

R^2 (Cox & Snell) = .26 ; R^2 (Nagelkerke) = .36 ; Model χ^2(df) = 51.07(7)***

* $p < .05$; ***$p < .001$

4. Discussion

The general goal of this research was to follow a recent invitation to examine the joint contribution of TPB and implicit cognition measures for predicting social behaviors (Ajzen & Dasgupta, 2015). We did so by combining a TPB measure and a field-identification IAT measure to predict academic persistence. In doing so, we combined for the first time TPB and IAT measures to predict a behavior. As an additional asset, we also introduced for the first time a measure borrowed from implicit cognition in academic persistence research, the latter of which has extensively relied on self-reported measures, so far (e.g., Cabrera et al., 1992; Eccles & Wigfield, 2002; Pascarella & Terenzini, 2005; Roland et al., 2016a; Schmitz et al., 2010; Tinto, 2006). The measure that best illustrates this deliberate approach is students' intention to persist (Braxton, Bray, & Berger, 2000; DaDeppo, 2009; Schmitz & Frenay, 2013). In contrast, the use of more indirect measures has never been examined in research on academic persistence, although it was examined in research on vocational choice (Arroba, 1977; Gati et al., 2010).

We found that the field-identification IAT measure (i) strongly predicts persistence, (i) strongly predicts it over and above comprehensive TPB measures, and (iii) predicts, by a large margin, persistence more strongly than TPB measures do, when collected six months ahead of students' actual persistence decisions.

These findings may be interpreted in different ways. One interpretation is that unconscious determinants of people's behavior operate independently of people's conscious beliefs and deliberate intentions. At first sight, this interpretation is consistent with our finding that the IAT measure was uncorrelated with TPB measures and that the association between the IAT measure and persistence was not mediated by intentions (as IAT and intentions were not associated with each other). We do not subscribe to this latter interpretation.

As a matter of fact, recent research shows that constructs measured by the IAT can be formed through fully deliberate learning processes (e.g. Gast & De Houwer, 2012; Kurdi & Banaji, 2017; Van Dessel, De Houwer, Gast, & Smith, 2015) and that people are able to consciously introspect their IAT score (Hahn, Judd, Hirsch, & Blair, 2014). More generally, that indirect measures reflect the operation of either independent learning pathways or behavioral expression pathways has been questioned lately (for a recent discussion, see Corneille & Stahl, 2018)

Instead, the current findings may suggest that students' intentions are less stable than their identification to the field. As time goes by, students may experience situations that lead them to revise their beliefs and so update their attitudes, perceived norms, sense of control, and ultimately their intention to persist. This is in line with research showing that temporal distance weakens the intention-to-behavior association (McEachan, Conner, Taylor, & Lawton, 2011; Sheeran, Orbell, & Trafimow, 1999). This second interpretation suggests that the predictive advantage of the IAT resides in the higher stability of the construct it tackled (i.e., identification to the field). For instance, in the first months of their studies, many students are disappointed that they have to attend very general courses (e.g., physiology and statistics) instead of more specialized psychology courses (Neuville, Frenay, & Bourgeois, 2007; Roland, Frenay, & Boudrenghien, 2016b). Those students may thus revise their intention to persist in a program that does not fulfill their expectations, while still feeling attracted to psychology in general (Roland et al., 2016b). Field-identification may be less sensitive to the latter disappointment and motivate students to persist in their studies. If this interpretation is correct, one may speculate that for students more advanced in their curriculum, the predictive gap between intention and IAT measures decreases (as the courses become more specialized from year to year). One may also predict that, within the first year, the IAT-intention predictive gap decreases over the year, and also that the IAT measure is more stable than the intention measure. Finally, one may predict this IAT-intention predictive gap to be smaller in academic fields where students' expectations about curricula are possibly more realistic (e.g., mathematics, engineering). The hypothesis that the IAT measure was more stable than the direct measure of intention should, however, be confirmed in a longitudinal study.

In any case, when it comes to the question of which measure may be favored for diagnostic purposes, the current analysis clearly supports the field-identification IAT, at least for the student population considered here, one that suffers from massive dropout rates in the first year (Romainville & Michaut, 2012). This conclusion is in line with research showing that the link between intention and persistence is highly variable and typically weak (Bers & Smith, 1991; Cabrera et al., 1992; Pascarella, Duby, & Iverson, 1983; Sandler, 2000). Note that an interesting question for future research is whether a *deliberate* field-identification measure may not serve the same purpose, for instance using a self-reported pictorial self-categorization measure (Schubert & Otten, 2002). Answering this question would be of paramount interest for both implicit cognition theorization and academic guidance. One possibility is that IAT and deliberate identification measures complement each other. Alternatively, a field-identification IAT may outperform, as this measure is likely to be less contaminated by social demands and introspective effects.

Finally, another interesting finding of the current research is that a precise and deliberate behavior can be better predicted by an IAT measure than by several TPB questions. Two comments have to be made here. First, this finding may seem inconsistent with the compatibility principle inherent in the TPB, which states that a specific behavior is best predicted by a diversity of precise questions (at least when they are separated by a significant time delay). Again, however, it should be noted that TPB measures were probably collected here too early to secure their maximum predictive value. Second, the fact that the IAT measure predicted a behavior as deliberate as persisting in an academic curriculum may seem problematic for research suggesting double-dissociations in measure and behavior types such that deliberate and conscious behaviors would be

best predicted by self-reports whereas more automatic behaviors would be best predicted by indirect associative measures as the IAT (e.g., Friese, Hofmann, & Schmitt, 2009; Hofmann et al., 2005). However, numerous studies, along with the present one, have reported findings inconsistent with the dissociative view. For instance, IAT measures have been shown to successfully predict behaviors as deliberate as political votes (Arcuri et al., 2008) or suicide attempts (Nock et al., 2010).

The present results should be interpreted in the light of several limitations, which call for future research. First, this study was conducted only with psychology students. As discussed above, it is important to replicate this study with students from other faculties, and also from other universities. To achieve this, it would be necessary to conduct pilot studies to identify stimuli relevant to each field of study (Greenwald et al., 1998; Nosek, Banaji, & Greenwald, 2010). Second, the stimuli used in the IAT tested here focused mostly on clinical psychology. These stimuli stem from the pilot study we carried out and may therefore be considered as valid. Although the resulting IAT predicted overall academic persistence in psychology, it is possible that some students, who were attracted to other fields of psychology (e.g., work psychology), felt less identified with these stimuli and that for these students the IAT was less predictive of their specific future persistence.

Despite its limitations, however, this study provides a first test of the role of implicit cognition measures in predicting academic persistence, and more generally in complementing TPB measures. Neither of these objectives was empirically addressed so far. Indeed, direct measures are by very far the dominant norm in educational research. This more generally points to the interest of bringing different fields of research together; in the present case, educational and social psychology.

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