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Extending the Return Potential Model With a Descriptive Normative Belief Measure

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ABSTRACT

Norm research continually informs our understanding of the relationships between societies and natural resources. This research note presents an operationalization of descriptive beliefs within the return potential model (RPM) framework. We observed significant differences between a traditional RPM measure of approval and a descriptive measure of commonness in the context of boaters' aquatic invasive species mitigation behaviors. These results provide empirical evidence of two normative belief dimensions manifesting with different structure and characteristics within the same natural resources setting. The implications of these results are twofold: (1) they demonstrate the utility and added value of an RPM that conceptualizes and operationalizes multiple normative belief dimensions and (2) provide researchers and managers with a methodology that is complementary to established methods but improves the comprehensiveness of applied norm research within natural resource settings.

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Introduction

Beliefs about which behaviors are approved or common—normative beliefs—are a ubiquitous element of individual decision-making, social interaction, and behavior regulation. The return potential model (RPM) and the structural norm approach (SNA) are influential methods within natural resources that attempt to measure and evaluate those beliefs (Jackson 1966; Vaske and Whittaker 2004). Established RPM methods quantify belief structure and characteristics via the aggregation of personal ratings of a behaviors approval or acceptability (Figure 1; Manning 2013). Yet this traditional measure represents only one dimension of a broader normative belief structure (Schwartz 1973; Bicchieri and Xiao 2009; Cialdini 2012). That broader structure also includes normative social beliefs represented, generally, by (a) an injunctive (normative) dimension, which encapsulates beliefs about what a person believes others think they should do, and (b) a *descriptive* (empirical) dimension that represents beliefs about what a person

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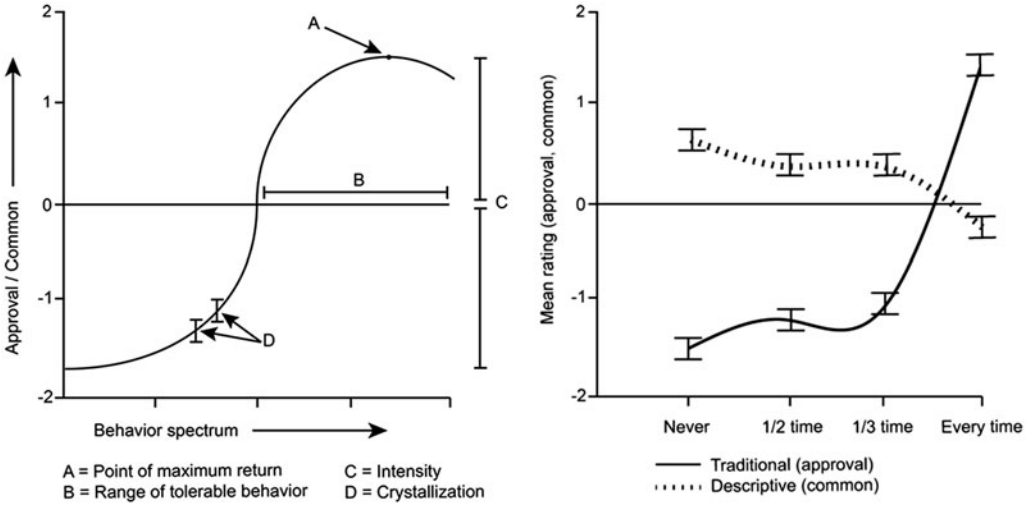

Figure 1. Graphical representation of a traditional return potential model (left) and results from extended RPM displaying mean approval and commonness ratings across the four levels of clean, drain, dry AIS mitigation behaviors, ±SE (right).

believes others do, i.e. beliefs about common or typical behavior (Bicchieri 2017). In this article, we focus on incorporating the latter into the RPM framework.

Beliefs about common behavior are an important factor in cognitive processes that shape behavior (Cialdini 2007). As such, measuring descriptive beliefs is complementary and provides a more comprehensive quantification of normative beliefs, their characteristics and structures, within natural resource settings (Schultz, Tabanico, and Rendón 2008). The inclusion of a descriptive measure, for instance, allows researchers and managers to ascertain if perceptions of (dis)approved behavior (mis)align with those of (un)common behavior (Brauer and Chaurand 2009). In this research note, we present a basic methodology to incorporate a descriptive measure, commonness, alongside a traditional approval measure within the RPM. To guide our research, we asked how do ratings of commonness and approval differ across a behavior spectrum and what implications do results have for applied norm research in natural resources management settings?

Methods

Return Potential Model

The RPM examines the distribution of normative beliefs in the form of ratings of (dis)-approval, which reflect perceptions of a norm (behavior standard) and degrees of normativeness (Figure 1; Jackson 1966). The model also represents a definition of a norm as a process or range of related behaviors rather than a static or singular phenomenon (Jackson 1966; Nolan 2015). That is, people may believe a certain behavior is ideal but approve of proximate behaviors (i.e. a norm is a gradient of related behaviors rather than a single uncompromising behavior being correct and all others incorrect).

Table 1. Traditional and descriptive return potential model metrics and descriptions (letters correspond to Figure 1).

	Description
Traditional metrics	
Point of maximum return	Behavior(s) most approved; the apex of the curve (A)
Range of tolerable behavior	Spectrum of behaviors rated as (dis)approved; behavior(s) above the origin (B)
Intensity	Normative strength; remains independent of valence, i.e. positive and negative ratings have equal intensity (C)
Crystallization	Degree of consensus; how strongly a behavior is (dis)approved (D)
Normative power	Degree of normative regulation; intensity and crystallization combined. For example, (a) high intensity/crystallization indicates agreement; (b) low intensity/crystallization indicates limited normative regulation; (c) high intensity/low crystallization indicates emerging normative regulation; (d) low intensity/high crystallization indicates agreement but lack of concern
Descriptive metrics	
Point of maximum return	Behavior(s) rated most common: the apex of the curve.
Range of typical behavior	Spectrum of behaviors rated as (un)common; behavior(s) above the origin
Descriptive intensity	Empirical expectation; degree to which behavior is believed (un)common. High descriptive intensity implies greater likelihood that a behavior occurs or not, i.e. positive and negative ratings have equal intensity
Descriptive crystallization	Degree of consistency/consensus. High descriptive crystallization (low variance) indicates agreement that low behavior levels are uncommon, high levels common, and behavior is consistent. Low crystallization suggests relatively less consensus and consistence
Empirical power	Degree of behavior normalization, i.e. (un)common within a group. Indicates the extent to which descriptive standards are established, emergent, or yet to exist

This conceptualization enables examination of the form and specificity of normative beliefs across a behavior spectrum and more detailed explanation of normativeness.

Operationally, the RPM has three components: a behavior spectrum (x-axis), a return potential dimension (y-axis), and a return potential curve in the two-dimensional space demarcated by the axes (Figure 1). The model assumes a behavior spectrum is continuous, from least to greatest degree. Quantifying the return potential dimension requires obtaining ratings of (dis)approval for each behavior and plotting those along the y-axis. Plotting ratings (y-axis) as a function of behavior (x-axis) creates the return potential curve as a graphical characterization of normative beliefs. Ratings provide further information in the form of norm metrics (Table 1, Figure 1). Norm metrics enable analyses of normative belief existence, strength, and structure. For example, crystallization, the average variance in ratings across all behaviors, represents consensus or agreement whereas intensity is indicative of normative strength via the mean absolute value of each behaviors' average rating. Norm metric calculations are available online (Supplementary material, Table S1; see also Nolan 2015). Corresponding descriptive norm metrics are detailed in Table 2.

Data Collection

Our study focuses on recreational boaters' beliefs about aquatic invasive species (AIS) mitigation behaviors. Data were collected from a cross-sectional survey of licensed Texas boaters randomly selected from a Texas Parks and Wildlife Department database. Participants were solicited via email to complete an online Qualtrics questionnaire. Following a modified tailored design protocol, 9500 participants were contacted up to five times, approximately 1 week apart, until they completed the questionnaire,

Table 2. Descriptive statistics of (a) normative belief ratingsa associated with AIS mitigation behavior approval and commonness and (b) traditional and descriptive model norm metrics (mean, standard deviation) ($n = 1179$).

Belief ratings	Traditional (approval)	Descriptive (common)
Never***	1.45 (0.86)	3.31 (1.11)
CDD one-third time***	1.74 (0.97)	3.15 (1.01)
CDD one-half time***	1.87 (1.03)	3.15 (0.96)
CDD every time***	4.33 (1.21)	2.79 (1.20)
Norm metrics		
Point of maximum return	CDD every time	Never
Range of tolerable (typical) behavior	CDD every time	Never–CDD 1/2 time
Intensity***	1.51 (0.17)	0.80 (0.13)
Crystallization[b]	1.05 (0.31)	1.15 (0.23)
Normative/empirical power*	0.31 (0.14)	0.14 (0.03)

[a]Ratings not recoded (scale is 1–5).
[b]Lower scores indicate greater consensus/expectation.
*$p < .05$, ***$p < .001$.

voluntarily opted-out, or were otherwise removed from mailing list (Dillman, Smyth, and Christian 2014). We received 2324 completes and partials (27% effective response rate). Of these, 1179 participants completed the requisite RPM measures used in our analyses.

Participants' age ranged from 19 to 85 ($M = 55.5$), 91% identified as male and 94% as white. Twenty-one percent reported a high school diploma or equivalent, 24% a vocational or 2-year degree, 36% a 4-year degree, and 19% a postgraduate or professional degree. Sixty-six percent reported a gross annual income >$100,000 USD and 13% <$20,000.

Materials

Four vignettes represent our behavior spectrum (adapted from Nolan 2015) (Supplementary materials, Tables S2 and S3). Behaviors were conceptualized from least to greatest degree: a boater who engages in recommended Clean Drain Dry™ (CDD) behaviors (1) never, (2) one-third of the time, (3) one-half of the time, and (4) every time they boat. For each behavior vignette, participants were asked to rate their (dis)approval of the individual's behavior on a scale from *Definitely Disapprove* (1) to *Definitely Approve* (5) (recoded −2 to +2). The descriptive measures asked participants to indicate how (un)common they believed the described behaviors were among boaters on an analogous scale from *Very Uncommon* (1) to *Very Common* (5) (recoded −2 to +2). Two return potential curves were generated, and associated norm metrics computed.

Results

Ratings of AIS mitigation behaviors varied significantly across the traditional and descriptive models, manifesting distinct normative belief structures (Figure 1; Table 2). Chi-square tests revealed participants' ratings of approval and commonness for each CDD behavior significantly differed: *never* ($\chi^2 = 110.90$, $df = 16$, $p < 0.001$, $\Phi_c = 0.14$); *one-third of the time* ($\chi^2 = 116.52$, $df = 16$, $p < 0.001$, $\Phi_c = 0.14$); *one-half of the time*

($\chi^2 = 108.70$, $df = 16$, $p < 0.001$, $\Phi_c = 0.13$); *every time* ($\chi^2 = 119.53$, $df = 16$, $p < 0.001$, $\Phi_c = 0.14$) (Supplementary materials, Figures S1 and S2).

Overall, mean approval ratings increased as CDD behavior increased, with "every time" garnering the highest approval. This single behavior also represented the point of maximum return (PMR) and range of tolerable behavior (RTB) (Table 2). In contrast, mean commonness ratings remained near the origin (as likely to occur as not), the descriptive PMR was "never", and a broader, multi-behavior RTB was observed. Variation across norm metrics were analyzed via independent samples *t*-test (Table 2). Intensity ($M = 1.51$, $SD = 0.17$) differed significantly from descriptive intensity ($M = 0.80$, $SD = 0.13$), $t(10) = 7.25$, $p < 0.001$, Cohen's $d = 4.69$. Normative power ($M = 0.31$, $SD = .14$) differed significantly from empirical power ($M = 0.14$, $SD = 0.03$), $t(10) = 3.13$, $p < 0.05$, Cohen's $d = 1.68$. Crystallization did not vary significantly across traditional ($M = 1.05$, $SD = 0.31$) and descriptive models ($M = 1.15$, $SD = 0.23$), $t(10) = 0.95$, $p = 0.37$, Cohen's $d = 0.37$.

Discussion

This research note sought to quantify and demonstrate the utility of incorporating a descriptive normative social belief measure within the RPM framework and assess differences between the traditional measure. Results suggested beliefs about how common CDD behaviors are vary significantly from beliefs about their approval. We observed a single-tolerance standard in the traditional model and a broader, multi-behavior descriptive standard. These observations—of different normative beliefs existing concurrently for the same behavior(s)—are consistent with past empirical work and emphasize the importance of measuring multiple normative belief dimensions, concurrently (Thøgersen 2008; McDonald, Fielding, and Louis 2014). Further analyses observed significant differences between associated norm metrics, intensity (strength) and normative or empirical power (regulation, normalization). Results provided initial evidence that different dimensions of normative beliefs manifest in a natural resource management setting with distinct structures and characteristics along the same behavior spectrum.

Reducing the impacts of AIS requires that every boater conducts mitigation behaviors every excursion. Our quantification of descriptive beliefs aids in revealing a non-ideal management situation wherein boaters perceive limited social proof that others engage in mitigative actions. In social or public settings, knowing or believing others engage in a behavior is often an important behavioral antecedent (Cialdini 2007). In the context of this study, the utility of the descriptive RPM arises from the implication that AIS mitigation behaviors and their normativeness need to be more overt. In other contexts, a descriptive measure can reveal a similar situation or provide partial evidence of false consensus effect or pluralistic ignorance (Monin and Norton 2003). For example, coupling descriptive RPM data with behavior data can identify false consensus, wherein people overestimate the extent to which others think or behave like them (others think/act like I do). This can help managers design and prioritize appropriate outreach and education to target users on the lower end of CDD beliefs or behaviors.

The data provided by an extended RPM (eRPM) expands managers' evidence-based decision-making toolkit. Managers assessing stakeholder behavior may find an eRPM provides an alternative or insightful perspective that corroborates other forms of data and evidence (e.g. observed or self-reported behavior). Coupling a descriptive RPM with other behavior- and cognitive-focused data could also help managers understand if they need local- rather than global-level intervention to better align stakeholders' beliefs, perceptions, and observable behavior (Blanton, Köblitz, and McCaul 2008). While our study was statewide, a more local application could be beneficial. For example, projects could incorporate an eRPM into a pre- and post-project evaluation to quantify stakeholders' normative beliefs before and after implementation of a new management practice or policy. Moreover, the descriptive RPM curve alongside measures of descriptive crystallization or empirical power could help managers assess the establishment, consistency, and range of (un)desirable beliefs and behaviors. Lastly, these data, alongside other behavioral data, could provide converging evidence of changing beliefs or norms among target groups. This information is essential to understand behavior change and design interventions that increase the prevalence of conservation behaviors (McLeod et al. 2015).

For researchers, these results illustrate the utility of a descriptive RPM measure, which provides a complementary and more complete assessment of normative belief structure (form) and characteristics (specificity). In certain settings, the exclusion of a descriptive measure limits the usefulness of the RPM as there is potential to subsume is with ought or discount the influence of descriptive normative beliefs (or norms), in the form of social proof, on behavior (Shelby, Vaske, and Donnelly 1996; Vaske and Whittaker 2004; Cialdini 2007). Measuring perceptions of (dis)approval and (un)commonness acknowledges a multidimensional normative belief structure, i.e. personal, descriptive (empirical), and injunctive (normative) (Bicchieri 2017).

In terms of future research, others may replicate our methodology to better situate its validity, reliability, and practicality. That may include coupling eRPM data with self-reported or observed behavior to reveal alignment or misalignment between various levels of belief and behavior (e.g. false consensus). Others may further develop an eRPM that conceptualizes and operationalizes a more precise measure of normative beliefs; for example, one that incorporates first- and second-order beliefs and expectations (Bicchieri 2017). In conclusion, by extending the RPM framework, researchers and managers increase its utility, integrate advances in applied norm research, and benefit from the complementary data it affords.

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