TOWARD THE INDENTIFICATION AND REFINEMENT OF A BEHAVIORAL

INDICATOR OF IDENTITY COHERENCE

A Thesis

by

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ABSTRACT

Borderline personality disorder (BPD) is a devastating mental illness, occurring at a rate of 1-5% within the general community and 15-20% of those already seeking treatment (i.e., clinical samples). A complex disorder, BPD is described as a kind of pervasive dysregulation, manifest as instability of affect, behavior, cognition, and identity. The dysregulated identity component includes a broad array of indicators but centrally regards a poorly developed self-schema—a conceptual frame of reference lacking sufficient structural integrity to support the consistent and independent experience of one's self. Historically, BPD has been considered difficult to diagnose, and current forms of assessment rely exclusively on variants of self report. Such procedures are problematic insofar as the underlying construct—problematic identity— suggests inherent difficulties in first-person accounts. Despite the variety of experimental indicators targeting dysregulation of affect and behavior, as well as interpersonal functioning (e.g, Ekman facial emotion recognition task, interpersonal trust tasks, monetary delay tasks and go/no-go tasks), to date, no experimental indicator for the dysregulated identity component has been identified. Broadly, the current project aimed to establish and refine a behavioral indicator of the coherence of personality structure, utilizing a cognitive paradigm that taps the self-system—the Self-Reference Effect (SRE). While the SRE is listed in RDoC material for its potential utility as a paradigm for the measure of self-perception as a social process, at this point there are limited data to suggest how it might be useful. Given the 40 years of results indicating that the self can serve an active and powerful role in processing personal data, the current investigation piloted the potential utility of the Self-Referent Effect in identifying identity dysregulation.

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Problematical Identity was measured by the identity subscale of the Borderline Features Scale of the Personality Assessment Inventory (PAI). Two cut points were made along this dimensional indicator, identifying a normative group, an elevated group—considered informative of borderline personality symptomatology, and an exploratory group—self-reporting as markedly low on problematical identity functioning. Word recall and response time were investigated across the three groups and preliminary findings suggested a pattern of enhanced performance for the normative identity group, who appeared to demonstrate a stronger mnemonic effect from the use of their self as an encoding strategy, relative to the two groups self-reporting indicators of problematical functioning. For the two problematical identity functioning groups, the use of the self does not appear to be as effective of a mnemonic device. These initial results provided support for the use of this task and suggest following up on the design is likely warranted.

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INTRODUCTION: OVERVIEW OF THE CURRENT EXAMINATION

As a symptom of Borderline Personality Disorder (BPD), dysregulated identity can be characterized as a poorly developed self-schema—a conceptual frame of reference lacking sufficient structural integrity to support the consistent and independent experience of one's self as distinct from others, a sense of self which lacks coherence across both time and place (e.g., see Jorgensen, 2006)—where coherence refers to "the quality of forming a unified whole" (Webster's Dictionary, 1959, p. 520). As a symptom of BPD, dysregulated identity has been associated with overall higher levels of psychiatric symptoms, including elevated anxiety, anger, and depression scores, as well as increased concurrent personality disorder diagnosis (e.g., see Sollberger, 2011). More broadly, recent meta-analytic data suggest that individuals diagnosed with BPD have a 10 year suicide rate 50% above national averages (i.e., roughly 10% of those who meet criteria will complete suicide within the next 10 years) (Pompili, Girardi, Ruberto, & Tatarelli, 2005). Given the base rates to which these findings apply—1-5% within the general community and 15-20% of those already seeking treatment (i.e., clinical samples)—attempts to reduce barriers to treatment, and increase clinical prowess aimed at detection and intervention, are warranted. However, despite the variety of experimental indicators relevant to BPD (i.e., behavioral / performance-based indicators), targeting dysregulation of affect and behavior, as well as interpersonal functioning (e.g, Ekman facial emotion recognition task, interpersonal trust tasks, monetary delay tasks and go/no-go tasks), there has been little progress in developing a comparable performance-based paradigm with which to study structural identity deficits.

To date, no experimental indicator has been identified for the dysregulated identity component, with current forms of assessment relying exclusively on variants of self and other-based reports and/or interview methodologies. Such procedures are problematic insofar as the underlying construct being assessed—problematic identity—suggests inherent difficulties in first-person generated accounts. The goal of the current project is to develop and refine a performance-based paradigm to assess identity coherence by relating self-referent memory performance to self-report markers of BPD features of identity disturbance.

Toward that end, the Self-Reference Effect (SRE) (Rogers, Kuiper & Kirker, 1977) is an empirically-derived, highly replicated cluster of related findings which may have promise as an aid to examine the structure of the self. While the SRE is listed in RDoC material for its potential utility as a paradigm for the measure of self-perception as a social process, at this point there are limited data to suggest how it might be useful. Based on 40 years of results (for a meta-analytic review, see Symons & Johnson, 1997)indicating that the self can serve as an active and powerful role in processing personal data (for a meta-analytic review, see Symons & Johnson, 1997), and going beyond previous examinations of the content of the self within groups conceptualized as manifesting problems in identity (details to follow, see background on the SRE), the focus of the current line of inquiry was to examine whether individual differences in putative self-concept coherence can be reliably associated with differences in incidental recall, within a self-referent/semantic comparison design. If indeed there is a reduced self-referent effect for people with BPD symptoms, this supports the contention that the structural organization hypothesized to provide the depth of processing benefit identifiable for most individuals is less well-developed or articulated.

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Toward the goal of developing and refining a performance-based paradigm capable of informing on identity coherence, first, a review is presented on the constructs Self and Identity. Emphasized are the philosophical/theoretical considerations provided by William James and the theoretical/ developmental/clinical considerations of Erickson, also touching on Kernberg and associated theorists, as well as attachment theorists.

Next, given the DSM ideally represents any consensus within the field on construct instantiation, a detailed review is presented of the DSM's management of the Self and Identity constructs, beginning however in DSM-III (1980) with the introduction of borderline personality disorder. Also reviewed are empirical examinations of the Self and Identity Constructs as they relate to borderline personality/BPD.

Emphasized throughout are several distinctions; namely, the distinction between the constructs Self and Identity, the distinction between Identity structure and Identity content, and the distinction between borderline personality (as a structural deficit with associated organizational, i.e., content, issues), and borderline personality disorder (a diagnostic entity).

Next, a transition to a review of the Self-Reference Effect, both theoretical considerations as well as previous empirical examinations, emphasizing the strength of the effect as a whole, methodological considerations related to distinguishing Identity structure from Identity content, as well as the SRE's previously demonstrated ability to distinguish Identity structure from Identity content. With the overarching goal to take what is known about the Self-Reference Effect and to refine a paradigm capable of maximally differentiating normative from problematical identity, it was necessary to identify a design with a history of detecting self-referent effects. An overview is presented of the design

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characteristics which were reviewed, which is only a selection from a detailed review which was performed of the cross-literature models for the family of findings collectively referred to as the SRE, which focused on patterns in effect-size estimates for significant between and within-class mediators and moderators. Following selection of the design characteristics, the aims of the project are iterated, and hypotheses made.

The Method reviews the methodology of the current pilot; the procedures employed; the statistical formation of groups, and the handling of data. The Results presents findings, interpretation of which is facilitated by effect sizes, and the Discussion summarizes the findings, highlighting considerations of limitation and directions forward.

William James on Self and Identity

Attempts to delineate the essential features of "the self," as a construct, have a complex history, and to date, both the parts and whole have remained under investigation (Jorgensen, 2006). In psychology, discussion surrounding the Self, and a related construct, Identity, are frequently traced to William James, who presents a notion of the self as *both* the I as well as the Me. From Psychology: A Briefer Course, James states at the outset:

   "Whatever I may be thinking of, I am always at the same time more or less aware of myself, of my personal existence. At the same time it is I who am aware; so that the total self of me, being as it were..., partly known and partly knower, partly object and partly subject...we may call one the Me and the other the I."

Of the many possible Me-Self's to which James refers, all can be considered together in the unity of feeling they arouse; namely, the *sense of sameness or of ownership[1]*, *or of warmth*; as in the warmth which arises in one's heart when in the presence of someone loved, or even in the presence of the memory of someone loved.

In contrast to the Me-Self, James acknowledges that the I-Self is "is a much more difficult subject of inquiry" (p. 191), but forges on, stating "[the I-Self] is that which at any given moment *is* conscious, whereas the Me is only one of the things which [the I]

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[1] Regarding the distinction between same and ownership, James suggests it is difficult to draw a hard line "between what a man calls me and what he simply calls mine" (James, 1890; p. 174).

is conscious *of.* In other words, [the I] is the *Thinker*" (p. 191). For James, the saliency of the I's function, as a thinker, regards Identity, where in its purest form, *identity regards some perception or determination of sameness*—a thought-action (i.e., *determination)* carried out despite variation in appearance, or perhaps, the appearance of variation. Moreover, James describes personal identity as "the sense of sameness perceived *by* thought and predicated of things *thought about*. These things are a present self and a self of yesterday. The thought not only thinks them both, but thinks that they are identical" (p. 214). In other words, personal identity is the cause of as well as the result of the function of the I holding together *as one* all the seemingly disparate Me- Selves that are possible objects of the I as thinker. What's more is that this includes the I as a Me, and the I does this—maintains a continuity amongst the Me's—despite the dissimilarity and discontinuity of those Me's

For James, it is this feeling of warmth, present to you as an I, when reflecting on you as a Me, which underlies the sense of continuousness for consciousness in reflecting on its own self; or more simply, this feeling of warmth and ownership is what underlies our sense of self. James suggests the relevance of warmth for personal identity is immediately apparent, for when that warmth is lost, "accordingly, we find that, where the resemblance and the continuity are no longer felt," as, James' suggests is the case with disorders affecting the memory, "the sense of personal identity goes too" (p. 216). Or, James invites the reader to think of the stories you have been told, about you, as a child, but which you do not yourself remember. While you may "know yourself" as the owner of those behaviors, deeds, affects—yet because you do not remember yourself

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being the actor of the story, because you cannot "*feel yourself*" in the story—there is no warmth. James suggests that these stories are only *about* you; that they are not a part of you in the same way, and you can feel this difference.

Continued Relevance of James' Distinction: Self, Parts of Self, and Identity

The I-Self/Me-Self distinction drawn out by James is a pivotal one—for the socio-cognitive sciences, with their use of self-concepts and schemas; for clinical and developmental psychology, with their use of mental representations, working models, and object-relations; and relatedly, for psychoanalysis, with their use of, e.g., transference-focused psychotherapy; as well as within sociology or social psychology, with their use of identity (Sollberger, 2013). That is, all of these constructs make use of James' distinction (for a discussion, see for example, Fournier, et al, 2015; Sollberger, 2013; Tagini & Reffone, 2010). However, while James is careful *to maintain a distinction* between the Self, the parts of Self, and Identity, this is not always the case within psychology, where the terms are often used interchangeably. Noting this overlap, Kaufman, Montgomery, and Crowell (2014) explain that the literatures on self and identity have developed in relative isolation from each other, with work in one area seldom referencing work in the other. (For a more detailed discussion on identity, and its overlap with self, see Schwartz, Luyckx, & Vignoles, 2011). Kaufman, Montgomery, and Crowell (2014) suggest two areas of emphasis: the developmental literature, which has its efforts focused on normative identity development, and the clinical literature, which has its efforts focused on *failures* in normative identity development; as such, the authors suggest that the intersection of the developmental and clinical literatures function as a kind of vista, where one can more

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easily identify similarities and discrepancies in the various instantiations of the Self and Identity as constructs, as they have unfolded over time within the literature.

Erickson: Distinguishing Normative from Pathological Identity Development

In outlining normative identity development, Erickson (1968) refers to James' discussion of the "conscious sense of individual uniqueness," the "I," in its "unconscious striving for a continuity of experience" (p. 208), and suggests that the "me," in its continuity, results from a developmental process—an *"identity crisis—that ideally leads to ego-identity as an "integrated awareness and knowledge about oneself."* Erikson's conceptualization of normative identity development encompasses individuals' exploration of, and eventually commitment to, self-defining roles. As an adolescent explores these options, there are periods wherein that adolescent's identity is no longer consistent with his or her past self-concept (1956), and at least transitorily, periods wherein others' view of him or her no longer corresponds to the adolescent's current view of him/herself. This *identity crisis* —characterized by a lack of temporal correspondence in identity conceptualizations, and lack of confirmation of those nascent conceptualizations by others—is both a typical and a transitory phase of development.

The avoidance of such discomfort can only be maintained at the cost of failure to search out new self-related roles, selecting some and repudiating others, ultimately arriving at a particular sense of identity "fitted" for one's self. In contrast, *Identity Diffusion* characterizes a kind of failure of identity development.

Working from clinical case conceptualizations, Erickson outlines a kind of common "space" akin to situational triggers—i.e., not an explanation of the etiology but of the

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triggering confluence of events wherein identity diffusion emerges. Paraphrasing

Erickson, identity diffusion emerges wherein there is exposure to a grouping of experiences

requiring *simultaneous commitment to physical intimacy, occupational choice, energetic*

competition, and psychosocial self-definition—the central diffusion becomes manifest in

(a) problems with ***intimacy***—where there is the threat of engulfment or fusion, lack of

repudiation (a kind of opposite to intimacy), and later theorists will add fear of threat of

abandonment; (b) problems with ***perspective of time***— with milder forms as an experience

of urgency but also a loss of the consideration of time as a dimension of living. Relatedly,

Erickson describes these patients as struggling to go to sleep and wake, to regulate their

days, but more generally, to regulate themselves and their lives… a kind of "the time has

come and I will rise to the challenge" is markedly absent, or in other instances, is

acknowledged but fought against; (c) diffusion of ***industry***, where in the more severe cases

of identity diffusion there is an upset in the sense of workmanship, in the ability to

concentrate on a given task, or in pre-occupation with some one-sided thing to extent that it

is self-destructive; and finally, (d) the choice of ***negative identity***, which Erickson

describes as a way to avoid total abrogation of identity, and which often has its origins in

"those identifications and roles which, at critical stages of development, have been

presented to the individual as most undesirable and dangerous, and yet also most real" (p.

131).

In *Pathographic: The Clinical Picture of Identity Diffusion*, Erickson (1959)

remarks on his use of the term diffusion, commenting that he has repeatedly pointed out

that his use of the term is not a "felicitous one." He explains that the most common

meaning of the term diffusion is a centrifugal dispersion of elements. However, centrifugal dispersion has the sense of a kind of maintenance about a center, and in identity diffusion, there is a "split of self-images… a loss of centrality; a sense of dispersion and confusion, and a fear of dissolution."

Borderline Personality and Borderline Personality Disorder

The relevance of Erickson's discussion has remained, both for normative as well as non-normative identity development. Notably, however, Erickson's Pathographic of Identity Diffusion describes manifestations and sequelae of the so-called borderline personality; the structure of which Erickson describes as characterized by significant structural deficit (see quotes by Erickson in the last paragraph). In contrast, borderline personality disorder is, strictly speaking, a diagnostic entity, where diagnosis is made on the basis of observable and/or self-reported behaviors, affects, and cognitions, which are thought to serve as indicators for the relevant diagnostic criteria Borderline personality disorder (BPD) is a devastating mental illness, occurring at a rate of 1-5% within the general community and 15-20% of those already seeking treatment (i.e., clinical samples) (Swartz, Blazer, George & Winfield, 1990; Grant, Chou, Goldstein, Huang, Stinson, Saha, & Ruan, 2008). BPD is a complex disorder, in no small part owing to the "inconsistency factor" which is thought to characterize it (for example, see Hopwood & Zanarini, 2010). This inconsistency is often described as a kind of pervasive dysregulation (inability to regulate), characterized as instability of affect, behavior, cognition, and identity (Hoffman; NIMH Case Conference, 2007; DSM-IV/V; APA, 2000, 2013). BPD is considered difficult to diagnose and even harder to treat (Lieb, Zanarini, Schmahl, Linehan, & Bohus,

2004)—a matter further complicated by the stigma associated with it, where patients, rather than the disorder, are considered difficult. Meeting criteria is associated with recurrent episodes of suicidal behavior and suicide attempts (Skills, 2009), but, in part owing to that stigma, the literature has, historically, remarked that such patients are merely manipulative and such suicidal acts are mere threats. However, recent meta-analytic data suggest a 10 year suicide rate 50% above national averages (Pompili, Girardi, Ruberto, & Tatarelli, 2005)—roughly 10% of those who meet criteria will complete suicide within the next 10 years. Given the base rates to which these findings apply, attempts to reduce barriers to treatment, and increase clinical prowess aimed at detection and intervention, are warranted.

Identity Dysregulation, Self-Schema, and Borderline Personality Disorder

As it relates to BPD, the dysregulated identity component includes a broad array of indicators, characterized by a poorly developed self-concept, lacking coherence across time and place, where coherence—from the Latin *cohaerere (com-*"together"+ *haerere* "to stick")—quite literally refers to "a sticking together or uniting of parts," such that there is "the quality of forming a unified whole" (Webster's Dictionary, 1959, p. 520; OED, online). The dysregulated identity component can also be characterized as a poorly developed self-schema—a conceptual frame of reference lacking sufficient structural integrity to support the consistent and independent experience of one's self as distinct from others, with reductions in patients' ability to experience themselves as a unified whole (i.e., coherence), or to present a consistent impression across time and place—whether that impression regards affect, cognition, or behavior.

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Identity Structure and Identity Content

As described by Sollberger (2013), historically, most theorists have focused on Identity Coherence in terms of identity *content* (e.g., gender roles, vocational choice, political preferences, and religious beliefs), and the dimensions of identity (personal identity, social identity, and collective identity) to which those goals, values, and beliefs are directed.In a structurally-based view, the core of BPD pathology goes beyond content-based impairments of identity integration, to the underlying structure which, ideally, provides support for that content. For instance, what Erickson describes as identity diffusion, or, the "loss of centrality" (1959). Regarding structural impairments, Kernberg would describe "internalized objects," i.e., positive and negative aspects of the self and significant others, as not whole "representations" of the self and significant others (Kernberg, 1984). James might describe the I-Self as not able to *hold together as one*, or integrate, all of the Me-Selves, or more subjectively as the absence of the warmth, arising from the felt experience of sameness and continuity.[2] The functional impact of these structural deficiencies regards impairments in the ability of identity to accommodate itself to disparate incoming perceptual content (i.e., content which quite literally calls into question our sense of who we are) as such tasks require sufficient narcissistic capacity and reserve (for an impassioned discussion, see Fisher, 1985).

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[2] For more on this, refer to James' discussion of disorders of memory, dissociative disorders, and disorders of identity in his Principles of Psychology (1890)

In the structurally-based language of Kernberg (1975), insufficient narcissistic capacity, will result in an overly rigid, weak, or mixed, i.e., fragmented identity; or, in the attachment formation language described by Ainsworth, Blehar, Waters, & Wall (1978); Bowlby (1988); Hesse & Main (2000), the potential weaknesses or structural deficits of identity can be conceptualized as overly rigid (avoidant), weak (anxious), or fragmented (disorganized)—although this language more so applies to Identity content and an orientation toward self and other than Identity structure, per se.

Although often subtle, the clinical psychology literature is informed by and incorporates much of the (previously described) rich and diverse history of normative and non-normative self and identity, within BPD. Moreover, the Diagnostic and Statistical Manual for Mental Disorders (DSM) (American Psychiatric Association, 1952, 1968, 1980, 1994, 2013) ideally represents any consensus within the field on their instantiations—for the purposes of facilitating clinical utility, involving the assessment, diagnosis, and treatment of disorders.

Self and Identity in BPD throughout the DSM

BPD first appeared in the third Diagnostic and Statistical Manual for Mental Disorders (DSM-III; APA, 1980), where it is described as a kind of "instability in a variety of areas, including interpersonal behavior, mood, and self-image"; moreover, "no single feature is invariably present" (p. 321). As a criterion, identity disturbance is described as "manifested by uncertainty about several issues relating to identity, such as self-image, gender identity, long-term goals or career choice, friendship patterns, values, and loyalties, e.g., Who am I? I feel like I am my sister when I am good" (p. 323). In

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DSM-III Appendix B: Glossary of Technical Terms, identity is defined as "the sense of self, providing a unity of personality over time" (p. 361), and it is noted that prominent disturbances in identity or the sense of self are seen in Schizophrenia, Borderline Personality Disorder, and Identity Disorder.

Early attempts to characterize the borderline disorder involved differentiating it from schizophrenia (see Gunderson, Autry, Gunderson, Mosher & Buchsbaum, 1974 for adetailed account); noteworthy elements of construct overlap are, perhaps, present in the description provided in DSM-III (APA, 1980) for disturbances in sense of self— descriptions which are provided for schizophrenia:

> *"The sense of self that gives the normal person a feeling of individuality, uniqueness, and self-direction is frequently disturbed. This is sometimes referred to as a loss of ego boundaries and is frequently manifested by extreme perplexity about one's own identity and the meaning of existence..."* (p. 183).

The second construct mentioned—Identity Disorder—was intended to function as a diagnostic specifier, serving to maintain diagnostic continuity when the BPD diagnosis was not appropriate, given the age of the patient. Identity disorder was later renamed Identity Problem (DSM-IV, 1994 p. 685) and relegated to "other conditions that may be a focus of clinical attention." DSM-III summarizes Identity Disorder patient phenomenology as "severe subjective distress regarding the inability to reconcile aspects of the self into a relatively coherent and acceptable sense of self," and offers differential diagnostic guidelines with respect to BPD, where in BPD "identity disturbances are only one of several important areas of disturbance, and there is often considerable mood

disturbance." These early descriptions—no longer included in the DSM—arguably

provide some of the richest material for conceptualizing problematical identity.

Within the DSM-IV/DSM-5-II system (1994, 2013), BPD is summarized as a

"pattern of instability in interpersonal relationships, self-image and affects, and marked

impulsivity," and the problematic identity component is most explicitly characterized by

the third BPD-criterion: "a markedly or persistently unstable self-image or *sense of*

self"[emphasis added], although a number of additional criteria have been theorized as

rooted in problematical identity or self-states, including: chronic feelings of emptiness,

impulsivity, self-harm, and instability in interpersonal relationships (for a discussion, see,

for example, Crawford, Cohen, Johnson, Sneed, & Brook, 2004, p. 383; Jorgensen, 2006,

and for experimentally-derived evidence of the primacy of identity dysregulation in the

cascade of borderline symptomatology, see Lowmaster, 2013).

DSM-5-Alternative Model: Distinguishing Structure from Content

While the official personality disorder diagnostic system remained unchanged from

DSM-IV to DSM-5, the DSM-5 Personality and Personality Disorders (P&PD) Work

Group introduced a substantially revised "Alternative Model" (DSM-5-AM), where

diagnostic assignment requires determination of the level of severity of impairment in

personality functioning (Level of Personality Functioning Scale, LPFS), and the selection

of maladaptive personality trait-descriptors. The LPFS was the first measure of generalized

severity to be incorporated into the DSM, an addition long conceptualized as essential (e.g.,

Crawford et al., 2011; Livesley & Jang, 2000); Parker et al. 2002, Pulay et al., 2008; Tyrer

2005; Wakefield 1992; 2008)

In the Alternative Model, the current level of personality functioning is assessed along two core domains, each with two sub-components: intrapersonal or Self-functioning is assessed as Identity and Self-direction—and interpersonal functioning is assessed as Empathy and Intimacy. Here, Identity is understood as: "[the] experience of oneself as unique, with clear boundaries between self and others; stability of self-esteem and accuracy of self- appraisal; capacity for and ability to regulate a wide range of emotional experience." A BPD-specific characterization of identity functioning is provided, and understood to be "markedly impoverished, poorly developed, or unstable self-image, often associated with excessive self-criticism; chronic feelings of emptiness; dissociative states under stress." Next, maladaptive personality trait-descriptors are selected from the domains of negative affect, disinhibition, and antagonism—but, the overarching construct which is tapped in trait-selection regards typology—that is, trait selection is intended to address the problematical, prototypical styles of the diagnosis. In contrast, the level of functioning specifier addresses the current state functioning, theoretically independent of any stylistic specifiers. Notably, this two-part diagnostic process maps on to the distinctions presented at the outset between the coherence or structure of the personality system and the content of that structure—where the degree of structural integrity maps to the current level of functioning, just as the content of that structure maps to the stylistic components delineated by the traits included in the Alternate Model.

Empirical Explorations: Self and Identity in BPD; Identity Coherence

In Grinker, Werble, and Drye's (1968, p. 176) classical empirical study of

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borderline conditions, absence of indication of *self-identity* was listed as one of the four

principal characteristics of the borderline syndrome, and Spitzer, Endicott, and Gibbon

(1979) presented some of the first empirical findings that identity disturbance is one of *the*

defining criteria for the borderline disorder. A more recent empirical examination

(Wilkinson-Ryan & Westen, 2000), suggested four identity disturbance factors: *role*

absorption (where patients tend to define themselves in terms of a single role or cause),

painful incoherence (a subjective sense of lack of coherence), *inconsistency* (an objective

incoherence in thought, feeling, and behavior), and *lack of commitment* (e.g., to jobs or

values). The authors suggested that all four factors uniquely predicted BPD, but

particularly painful incoherence—comprised of items indicating a sense of "false self," a

lack of sense of continuity of self over time, and a sense of emptiness— distinguished

patients with borderline personality disorder (compared to those with other and no

personality disorder diagnosis).[3]

One line of clinical theorists summarizes such lack of continuity and incoherence as

sequelae of a "false self." Most generally, as described by Laing (1965, p. 94), "the false

self is one way of not being oneself."[4] More specifically, the false self describes an

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[3] Identification of these factors was through the use of therapist-identified characteristics related to patient
phenomenology.
[4] As noted by Laing (1959, p. 94), discussion of the "false self" can be sourced through an existentialist
orientation, for example with Heidegger (1953), Kierkegaard (1954), and Sartre (1956), as well as through a
psychoanalytic orientation, for example with Fairbairn (1952), Guntrip (1952), and Winnicott (1958, for
instance, section III, Clinical Material: Aspects of Fantas). Informed by these early contributions is Laing
(1959), and later, Miller (1979) and Masterson (1989). Prior to discussion, per se, regarding the false self,
informative are the stories relating the behavior of Theseus to both Ariadne and Phaedra—Racine's version of
the tale—or of course Ovid's portrayal of Narcissus' treatment of both Echo as well as himself). See also
Laing's footnote on page 94 of The Divided Self.

existence characterized by the lack of a "real, true" identity, where the existence of such a true self would give rise to an ongoing sense of who one is—coherent and consistent across time and space—as evident across the various intra- and interpersonal roles expected by daily life. One analogy for understanding the false self is that of the social mask; while (nearly) all social interaction requires that individuals wear "masks"— intended to present thoughts, feelings, behaviors, etc., which are not *wholly* representative of one's thoughts, feelings, behaviors—the "false self," in contrast, is more so a permanent mask and serves to protect against the vulnerability of a condition where, to varying degrees, there is *not* a "real self" underneath. Without this "real self" underneath the mask, it is, perhaps, not the individual who enters into the social situation, but rather the social situation which elicits the individual—in the most extreme cases, the mask is ever created anew. In all cases, it is the degree to which an individual experiences a true core self which enables them to enter into most any kind of situation, and despite the power of that situation, maintain not only their sense of who they are, but also present thoughts, feelings, and behaviors consistent with that ongoing sense of self—i.e., to remain true to themselves (Masterson, 1989; Yeomans, Clarkin, & Kernberg, 2002). A rather similar point is made by an extensive literature on the interaction of the power of the person and the power of the situation in determining human behavior (Mischel, 1968).

Recently, Sollberger et al. (2011) investigated the relation between identity diffusion and psychopathology in 52 in-patients receiving treatment for BPD. Findings suggested that those identified as high identity diffusion (i.e., low coherence) showed

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significantly higher levels of psychiatric symptoms, including anxiety, anger, and depression scores ($p < .01$), as well as increased concurrent personality disorder diagnosis ($p < .05$). Assessment measures included the Inventory of Personality Organization (IPO) and questionnaires measuring general psychiatric symptoms, mood states, and negative affect. Moreover, within BPD samples, identity disturbance has been investigated as a transdiagnostic construct (Neacsiu, Herr, Rodriguez, & Rosenthal, 2015). For instance, impairments in self-concept (identity disturbance) have been found to differentiate adolescents with BPD and comorbid major depressive disorder (MDD) from adolescents with MDD alone (Pinto, Grapentine, Francis, & Picariello, 1996), which suggests the identity deficit in BPD is a core component, and not merely an artifact of depressive severity. Reductions in sense of self (self-concept clarity) have been correlated with neuroticism, a marker for depression (Campbell et al., 1996), and identity disturbance has been correlated with both a heightened risk for substance use disorders (Rao, Vasudevan, & Nammalvar, 1981; Talley, Tomko, Littlefield, Trull, & Sher, 2011), as well as high anxiety in adolescents (Crocetti, Klimstra, Keijsers, Hale, & Meeus, 2009).

While the identity construct has been a subject of some study, empirical investigations of Identity coherence are quite limited. One method has involved the coding of patient narrative for coherence—where coherence is examined as an ability to integrate, organize, and tell a story about the self. The results of one investigation suggested that borderline personality features—assessed with the borderline subscale of the Personality Assessment Inventory (PAI-BOR; Morey, 1991)—were significantly

negatively associated with narrative coherence; that is, participants with greater borderline features were less able to integrate and organize stories about their self (Lovasz, 2009). The only known experimental manipulation involving identity coherence to date (Lowmaster, 2013) grouped undergraduates based on the borderline features subscale of the PAI. In the test group, participants provided descriptors of their "True Self," the process of which is similar to narrative tasks, in that it theoretically taps participant's ability to provide a coherent view of the self. In the control condition, participants provided, essentially, synonyms for the word "Round," or examples of things that are round, such as, for example, a pizza, which is round. Self-reported measures of self- concept clarity (SCC; Campbell et al., 1996), as well as additional measures, were taken immediately prior to and immediately following the manipulation, and in counterbalanced order, participants completed computer-administered tasks assessing behavior, where those behaviors are considered to be indicators of borderline pathology—a GoStop task of disinhibition (measuring response sets and the ability to inhibit a response) and a trust task measuring interpersonal functioning. Findings suggested that all participants, regardless of identity coherence, consistently rated the true-self task as more difficult than a control verbal fluency task. Following the True Self Task (self-description), however, participants classified as having high levels of borderline features rated the True-Self task as more difficult, and their performance on the GoStop task—a measure of borderline symptomatology (disinhibition)—worsened. In contrast, performance (on the GoStop task) improved for those participants classified with low levels of borderline features.

For those participants grouped as high on borderline features, the process of providing the True Self descriptors appears to have had a dysregulating effect, and while it may be that, for those participants grouped as low on borderline features, the process of providing descriptors was actually regulating, as evidenced by their improved behavioral control on the GoStop task, what is very clear, however, is the power of Lowmaster's design to "tap" the underlying "self system."

TOWARD A BEHAVIORAL INDICATOR OF IDENTITY COHERENCE

The Lowmaster paradigm was the first to successfully manipulate identity coherence, with both self-report and behavioral indicators of borderline symptomatology serving as measures of that success. More specifically, the GoStop task, as a behavioral indicator of dyscontrol, provides BPD-relevant markers of functioning related to impulsivity. Additionally, Lowmaster (2013) used an interpersonal trust task, which provides a behavioral indicator of interpersonal functioning. To date, however, the clinical literature provides no behavioral indicator of identity coherence. There is a need to establish behavioral indicators of identity coherence, as current forms of assessment rely exclusively on variants of self and other-based reports and/or interview methodologies. Such an approach could have broad application; within intervention research, for example, as a paradigm implemented at baseline and follow up to provide clinically relevant markers of patient functioning.

Background on the Self-Reference Effect

The Self-Reference Effect (SRE) (Rogers, Kuiper & Kirker, 1977) is an empirically-derived and highly replicated cluster of related findings (Klein & Nelson, 2015) from cognitive psychology which suggest that information considered for its perceived relevance to the self is generally recalled to a greater extent, and with greater accuracy, than information which is merely semantically meaningful (for a meta-analytic review, see Symons & Johnson, 1997). In a basic self-reference paradigm (See Table 1), participants are shown a series of items (usually words and often personality traits), and they are asked to consider those words in one of two ways. In the semantic condition, they consider

semantic meaningfulness of the words with a question such, e.g., "Does this word mean the same [as another]?" and in the self-reference condition, they consider the self-relevance of the word with a question such, e.g., "does this word describe you?" Participants are later instructed "to write down as many words as you can recall." Assuming an equal number of words across conditions, the formula for computing the self-reference effect (SRE) is simply the number of words accurately recalled in the self- referent condition minus the number of words accurately recalled in the semantic condition.

The investigative methodology for the Self-Reference Effect was an outgrowth of the Depth-of-Processing paradigm (DoP) (Craik & Lockhart, 1972). In a traditional DoP paradigm, subjects are asked to process an item at one of three levels (see Table 2), and in the most basic level, the items are not considered for semantic meaningfulness, but rather for some non-semantic quality of the word, such as its structure (e.g., how it looks) or its sound (e.g., whether it rhymes with another word). This is called the Shallow Condition (sometimes *Structural or Phonetic)*. In each instance, the participant remains the same; the stimuli (target words) remain the same, but the task condition changes, so as to generate systematic variability in the depth, or breadth of item processing. Repeated findings suggest that considering the semantic meaning produced a more elaborate memory trace than the Shallow Condition (i.e., participants remembered more words).[5]

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[5] Notably, SRE paradigms still generally include the Shallow Condition, although generally, neither the structural or phonetic task conditions are considered necessary to examine for the SRE itself; that is, the semantic orienting task is thought to provide the appropriate comparison, insofar as the SRE condition is posited as, fundamentally, a semantic encoding condition.

The initial explanation provided was that what varied across the structural and semantic

encoding conditions was the depth of processing required to perform the relevant semantic

extraction. However, as the understanding of the mechanism of action for the task

developed, the strength of a memory trace has become understood as a positive function of

the degree of elaboration of the encoded trace (memory)—with structural ratings producing

the least elaborate and semantic ratings the most elaborate memory traces—where a rough

conceptualization of "elaborate" is the "spread" of potential trace-activation in retrieval. [6]

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[6] Regarding depth (or levels) or processing, verses breadth (or spread) of activation: Most generally, depth of information processing can be thought of as the degree of semantic extraction required for information processing to occur, and which is considered the core feature thought to vary across the different task conditions (i.e., Self, Semantic, and Shallow), where the shallow condition does not require semantic processing, and the Self condition requires the same degree of processing as the semantic plus consideration of relevance to one's self, or personal meaningfulness. Regarding breadth of processing, Anderson and Reder (1979) further explicate: "the variation in memory with [depth of processing] (DOP) is a result of the number of elaborations subjects produce while studying the material, that these elaborations establish more redundant encodings of the to-be-remembered information, and that elaboration is what is critical, especially for long-term retention. Because extent of elaboration is the critical variable, a better spatial metaphor for the DOP phenomena might be 'breadth of processing'" (p. 385). While Anderson & Reder's (1979) description is clear, the somewhat colloquial use of "depth" has remained in vogue when describing the core differences in information processing though to be elicited by the different task conditions (i.e., Self, Semantic, and Shallow), where here, depth seems intended to describe the varying degree of semantic extraction required for information processing—how "deeply"
one must process an item.
The relevance of this aside to the overarching discussion on the functioning of identity may be clarified by longstanding discussions in the literature regarding whether the self is the actual cause of the self- reference effect, or whether some combination of the qualities of organization, elaboration, and distinctiveness, are the cause—where those qualities describe the type of information processing that is elicited by the task condition. (For an overview of the discussion, see Symons and Johnson, 1997.)
While these discussions have been ongoing in cognitive psychology, a modern psychodynamic personality theorist might describe those supposedly informational qualities (i.e., organization, elaboration, and distinctiveness) as precisely the kind of information processing which is facilitated by a well-developed, well-organized, self. Moreover, such a theorist might even use those terms to describe a structurally sound, well-functioning self—that is, one is that organized and distinct, and yet elaborate. Ultimately, should the Self-Reference Effect have some utility for the study of identity, identity researchers may find there is a differential utility in the use of terms depth or breadth, perhaps specifically in the conceptualization of the "distribution" of memory-spread / self-referent memory (or perhaps also autobiographical memory) within a "dysregulated" identity structure.

(For a discussion on the distinction between depth and breadth, as related to identity, see the second paragraph of footnote 7.) The Self-Reference Effect was discovered when perceived relevance to the self was added as an additional, Semantic, level of processing (Rogers, Kuiper & Kirker, 1977)—one providing an additional level of "enrichment" (p. 679), resulting in a more elaborate memory trace (i.e., enhanced recall compared to the Semantic Condition).

In the Self-Reference Effect, the Self is postulated as a superordinate schema, engaged in information management—hierarchically prioritizing and encoding information based on *its* perceived self-relevance. Activation of this superordinate schema theoretically facilitates more elaborate information processing, which facilitates enhanced incidental retention (recall), by increasing the spread of activation for any given memory trace—or more simply, the degree of interconnectedness between any two or more given bits of information, such that activating (recalling) one bit facilitates activation (recall) of any other (previously connected) bit. Inclusive of the-self-as- schema-model, the self can be considered in terms of its content, its structure, as well as its function—where content refers to *what is* hierarchically organized and stored in long- term memory,[7] and which has been "derived from a lifetime of experience with personal data" (Rogers, et al., 1977, p. 677); whereas the structure/function of the self regards the *how is* information processed and organized (both as a matter of procedural process and its "form" at "destination") (Kuiper & Derry, 1980; 1981), as well as the how well is that information processed and organized.

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[7] Although this model is approaching outdated, it still functions as a conceptual mechanism.

Meta-Analytic Findings

To date, a robust pattern of SRE- relevant findings have emerged in support of the hypothesis originally formulated by Rogers, et al. (1977): "The self serves an active and powerful role in the processing of personal data." In a 20-year meta-analytic review of the SRE literature, Symons and Johnson (1997) perform a detailed review of the cross-literature models for the family of findings collectively referred to as the SRE, as well as examined for patterns in effect-size estimates for within-class mediators and moderators. The results suggest a pooled mean weighted effect-size estimate for the Self-referent verses semantic condition of $d_+ = .65$ ($k = 60$; 95% CI = .58 - .71). To obtain homogeneity of effect-size estimates, 11 outliers (18%) were removed, resulting in a pooled mean weighted estimate $d_+ = .59$ (95% CI = .52 - .66), with a mean unweighted $d = .72$ (95% CI = .58 - .86). It should be noted however this is an overall class estimate for SR-Semantic and so includes free and cued recall as well as recognition (the CI for which include zero, i.e., it is non-significant as a class).[8]

Clinically-Relevant Investigations and Distinguishing Content from Structure

Modifications of the SRE paradigm have been utilized to investigate the role of the self in clinically related disorders.

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[8] While a number of studies have found effects with tests of recognition memory as the follow up, primarily this is in testing for a Self-Referent Effect in contrast to the memory effect facilitated by the use of *another* person (e.g., does this word describe your mom?)—not the Self-referent verses semantic conditions described in the current investigation.

While the stated intent is often to investigate for the presence of a self-referent effect, the majority of these studies utilize a self-referent task condition (e.g., "does this word describe you?") where the trait descriptors tap an element of mood, affect, and/or valence, thought to be salient to the disorder under investigation, and the descriptors themselves are selected to represent bimodal extremes of that salient continuum. For instance, to address questions such as: "do depressed individuals have a tendency to attend to and/or encode more negative than positive or neutral trait descriptors?" Both depressed participants and a non-depressed control group are presented with a list of, for example, positive (e.g., lively; gregarious) and negative (e.g., morose, sullen) and diagnostic-condition neutral (e.g., intellectual) trait descriptors. The outcome of interest is the tendency to remember more negative than positive or diagnostically neutral descriptors, relative to diagnostic standing. So for example, a person diagnosed with depression would be hypothesized to recall more words with depressed content. While the stated intent of study designs such as these is detect a self- reference effect (i.e., a memory advantage facilitated by or attributable to the additional depth of processing, or, the additional "spread" of trace activation, offered by the self, it seems rather that the design more so provides an indication of the consistency or inconsistency of descriptor-content with a participants' self content or view of their self content; or, the affective quality of participants' self content and the effect of affect on self-relevant memory (Derry & Kuiper, 1981). Some studies involving clinically relevant variance in item content are used in concert with, for example, fMRI or ERP (for instance, see Zhao et al., 2014), and it is likely that the areas and/or networks of brain activation as well as degree of activation are similar to the findings from studies of self-referential

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processing of diagnostically-irrelevant trait information, but to our knowledge, this has not been investigated.

In contrast to studies using a self-reference paradigm to examine for diagnostically relevant differences in recalled or recognized item content, a small body of clinically-relevant literature has emerged focusing on the content-independent memory advantage offered by the self. In these cases, the SRE paradigm has been utilized to examine disorders such as autism and schizophrenia—disorders theorized to involve a characteristic lack of self, with corresponding, measurable, deficits in intra- and interpersonal functioning.

Lombardo, Barnes, Wheelwright, and Baron-Cohen (2007) utilized a self- referent paradigm to examine the extent to which autism-spectrum conditions (ASC) are related to impairments in the intrapersonal self-referential domain. Thirty adults (age 19-45) diagnosed with either Asperger Syndrome or high-functioning autism, were matched with 30 healthy controls on age, sex, and IQ. Participants judged adjectives in relation to the self, a non-social semantic control condition, and two other task conditions outside the scope of the current review.[9] While a significant SRE was seen in individuals with ASC for adjectives rated with respect to the self, the observed effect was significantly decreased compared to the effect found for matched controls.

Utilizing a methodology similar to Lombardo et al. (2007), Harvey et al. (2011) investigated self-referent processing in a group of twenty-five patients diagnosed with schizophrenia and 22 controls.

Participants rated personality adjectives in each of three conditions: (1) structural features (determining whether words are presented in uppercase or lowercase letters); (2) social desirability (determining whether the words presented   are socially desirable or not); or (3) self-referential (determining whether the words presented describe oneself or not?). Recognition memory for these personality adjectives was then tested during an unexpected yes–no recognition test. While patients and controls were comparable in memory performance for the control conditions (structural $p = 0.12$ and social desirability $p = 0.30$), patients showed significantly reduced recognition sensitivity compared to controls for the self-referential condition ($p = 0.03$).

Finally, some studies have utilized combinations of the above, without sufficient appreciation for the nature of the task. For instance, Winter et al. (2015) reported a negative evaluation bias for positive self-referential information in borderline PD, where BPD patients ($n = 30$) and healthy control participants ($n = 30$) rated the positive, neutral, and negative emotional valence of words. The self-referential context, however, was varied by the study authors, not by the participant's determination; specifically, stimulus presentation (nouns) was preceded by a self-referential pronoun ("my"), an other-referential pronoun (e.g., Marie's"), or no referential context ("the"). The results of a subsequent free recall and recognition task suggested that BPD individuals differed from controls in judgment of item content—positive and neutral words were judged to be more negative than the same words by healthy control participants.

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[9] The remaining task conditions involved a similar close-other (i.e., a friend), and a dissimilar non-close   other (in this instance, Harry Potter).

However, the authors' findings that BPD patients did not differ from controls for self-referent memory cannot be interpreted, given the study design.

Interestingly, there is a notable literature involving the use of SRE paradigms with diagnostic entities theorized to involve problematical self structures, such as schizophrenia and autism. In these studies, however, there is a decided lack of available findings on the SRE itself (i.e., data are often not provided on the number of words recalled or recognized in the sematic and self-referent conditions). The reason for this is due, at least in part, to the use of the SRE paradigm as a behavioral task in concert with laboratory tasks designed to investigate the cognitive and neural correlates of self- referential processing.

Overview and Selection of Design Characteristics

As mentioned previously, the SRE refers to a family of related findings with similar but distinct methodologies (see Klein, 2016 for an overview). To facilitate the aims of the current endeavor, it was necessary to select an appropriate methodological course; ideally, one capable of maximally facilitating the detection of Self-referent effect findings and simultaneously reducing potential confounds. To identify a design with a

history of detecting self-referent effects, a detailed review of the cross-literature models for the family of findings collectively referred to as the SRE was performed—to identify patterns in effect-size estimates for significant between and within-class mediators and moderators. Presented here is an overview of the design characteristics which were reviewed, and unless noted otherwise, analyses reported here were those performed by Symons and Johnson (1997):

Memory test (dependent variable) was examined as free recall ($k = 54$, $d+ = .69$, 95% CI = .62 - .65), cued recall ($k = 2$, $d+ = .60$, 95% CI = .02 - 1.18) and recognition ($k = 4$, $d+ = .21$, 95% CI = .00 - .43). While the overall between-class effect was significant, post-hoc comparisons suggest free recall differed significantly from cued recall and recognition, but that cued recall and recognition did not differ significantly from one another—a finding which is further emphasized by the provided confidence intervals.

Semantic (control) task conditions. For example, control tasks where participants generate a definition or evaluate synonyms were associated with mean weighted effect sizes of 1.04 and .72 respectively, but were not statistically significantly different at post-hoc comparison; given the limited number of studies to employ "generate a definition" ($n = 4$) the results for the synonym condition can likely be considered more reliable.[10]

Stimulus (traits verses nouns) reported mean weighted effect sizes of .67 and .40, respectively, and were statistically significantly different.

Amount of Stimulus. As the number of words or memory load increased, the SRE also increased for traits ($k = 47$, $\beta = .26$, $p < .01$); however, when the stimulus items were nouns, the pattern reversed itself ($k = 11$, $\beta = -.47$, $p < .01$). In this case, as memory load increased, the SRE got smaller.

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[10] Such a paradigm relies on the careful performance of its participants. An "index" of participant attention can come from the task itself, insofar as the task requires that participants indicate whether the words are synonyms, and if a shallow condition is used as well, whether the words are capitalized. Agreement can quickly be assessed in a cross-tabulation / signal-detection model.

Type of Stimulus Processing. Relational, item-specific or both types of stimuli suggested mean weighted effect sizes of .51, .56 and .29, respectively. All effects were significant. Study designs using either relational or item-specific processing had a significantly larger effect than designs employing both relational and item-specific processing.

Presentation Time. Stimulus Presentation Time (length of time stimulus appeared on a screen) and time between encoding and memory test (in min) were both significant predictors of the magnitude of SRE effect sizes across the literature—the SRE tended to increase as the time between the encoding and memory tasks increased ($k = 60$, $\beta = .16$, $p < .05$) and to decrease as the length of stimulus presentation grew longer ($k = 60$, $\beta = -.60$, $p < .001$).

Overall, the findings from the review suggested the basic design elements utilized by Rogers, et al. (1977, Experiment 1)—a SRE paradigm consisting of three task conditions (see Table 1), where each participant provides ratings on the entire adjective set and target words are alternated to facilitate an equal number of "yes" and "no" responses for the structural and semantic tasks. (While this is not possible to accomplish for the self-description condition, as noted by Rogers, et al., 1977), there are nevertheless considerations of likelihood, depending on such factors as social desirability, meaningfulness, and likeability—perhaps particularly for stimuli potentially associated with demographic- or diagnostic-group standing—a highly relevant consideration within the current investigation.) Additionally, rating times are monitored for each judgment, with ratings followed by an incidental recall period.

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A final review was performed, to identify the studies highlighted by Symons &

Johnson (1997) with the same encoding and retrieval conditions as Rogers, et al., (1977).

This process yielded a total of 8 studies (see Table 3), which were consulted in

formulating the current proposal—either for clarification regarding specific aspects of the

method, or to provide more informed estimates of effect size (Katz, 1987; Kendzierski,

1980; Klein & Kihlstrom, 1986; Pullyblank et al., 1985; Register & Kihlstrom, 1987;

Rogers, et al., 1977; Sutton et al., 1988). Having arrived at a proposed design, next was

the process of selecting trait descriptors.

Stimuli List Development

Following an extensive review, it was determined that there is little to no uniformity

in the stimuli used in previous studies involving self-reference paradigms, making it

necessary to construct a list of stimulus adjectives for use in the proposed

investigation.(Table 4 presents the final series of 5-paired lists.) As previously mentioned,

there are a number of concerns related to the selection of stimuli and the possibility of

eliciting responses that relate more to some element of diagnostic standing than to self-

reference, per se. For instance, there is a large body of evidence on the differential impact

of emotion for individuals meeting criteria for BPD. For a brief review of empirical

findings, see Baer, Peters, Eisenlohr-Moul, Geiger, and Sauer, 2012. There is evidence of

compartmentalization of positive and negatively-valenced self related content (Vater,

Schroder-Abe, Weizgerber, Roepke, & Schutz, 2014), and in contrast to studies of the Self-

Reference Effect with normative populations, where there is a tendency to remember more

positive than negatively-valenced items regarding oneself (D'Argembeau, Comblain,

& Linden, 2005), findings from Fertuck et al. (2006) suggest that individuals elevated on

BPD-symptomatology tend to remember more negative than positively-valenced

personality trait descriptors. Most concerning for the present study are the findings from

Fertuck et al. (2006) which suggest that, when a negative-valence state is induced,

individuals elevated on BPD-symptomatology tend to show significant reductions in

memory capacity—relative to controls. In contrast to paradigms specifically intending to

examine these and other relatively established group differences, the current investigation

intends, specifically, not to capitalize on these differences, but rather, to determine whether

there is a reliably detectable difference in the self-referent effect in groups who differ in

their standing on the construct of interest—identity coherence. Given these concerns, the

main goal was to select stimuli with little likelihood of eliciting differences in preferential

attention, encoding, and subsequent recall, based on participants standing on the construct

of interest. Notably, previous investigations of the big-5 domains of personality

(Extroversion, Openness, Agreeableness, Conscientiousness, and Neuroticism) have

suggested differences   between those meeting criteria for BPD and control groups on all

domains except the Introversion/Extroversion and Openness/Intellect Domains of the Big-5

(for example,   see Morey et al., 2002). This consideration, along with the a literature base

extensive enough to support the claim that normative data exists on the Big-5 model

suggested that the big-5 domains of Introversion/Extroversion and Openness/Intellect were

an ideal   starting point for stimuli selection.

Overview of Stimuli Selection. The Big-5 is the result of a lexical approach to the development of a scientific taxonomy, but one rooted in the assumption that the salience of descriptors for personality research is informed by the degree to which those words are used and considered meaningful in day to day life (for a detailed discussion, see John & Srivastava, 1999). As such, Anderson's (1968) norms on word-meaningfulness were reviewed. Next, given the proposed investigation would require individuals to indicate the degree to which a trait-descriptor is or is not self-descriptive, Anderson's (1968) norms on word- likability were reviewed, as a proximal measure of social desirability. The first group of potential items came from an item bank, wherein 300 terms from the Adjective Check List (ACL; Gough & Heilbrun, 1965) were reviewed by a set of ten judges. Each judge independently sorted each of the 300 items in the ACL into one of the Big-Five domains or a sixth "other" category. Inter-judge agreement was substantial; coefficient alpha reliabilities ranged from .90 for Factor IV to .94 for Factor V, suggesting that the raters had formed a consensually shared understanding of the five dimensions. The result was the mapping of 112-items onto one of the Big-5 dimensions. All items from the Introversion/Extroversion and Openness/Intellect Domains were selected as potential items for the current study.

Next, Goldberg's (1992) 100-item unipolar trait descriptive adjectives set was consulted and the items from the Surgency (i.e., Introversion/Extroversion) and Intellect Domains were selected as potential items for the current study. From these two lists, there was a total of 86 potential items, but of the 86 items, 16 overlapped, resulting in 70 potential items.

These 70 items were then cross-referenced with two sets of norms: the Affective Norms for English Words (ANEW: Bradley & Lang, 1999), and Anderson's (1968) Likableness ratings of 555 personality-trait words, a highly cited reference for word meaningfulness and likability—specifically, the likability of an individual who is seen as exhibiting the particular trait descriptor. Of the 70 items, 16 items did not appear in either the ANEW or Anderson, resulting in a final proposed target list of 54 trait descriptors selected from the Introversion/Extroversion and Openness/Intellect Domains. Six (6) additional items were selected independent of those domains to serve as buffers against primacy and recency effects. Table 5 presents a sample stimuli list with the corresponding word norms just described.

Semantic (Synonym) condition. To construct the semantic condition, it was necessary to create two additional lists of synonyms and antonyms. An additional 54 synonym items were identified, following the procedure described by Rogers, through the use of Roget's Thesaurus. The additional items can all be considered trait descriptors, and while as synonyms they share a marked similarity with the descriptors from the domains of Introversion/Extroversion and Openness/Intellect, they are not specifically sourced from that literature. None of the synonyms selected overlap with the target words (i.e., there are 102 unique words). To complete the semantic condition, a third list of trait descriptors needed to be assembled, this one semantically unrelated to the target list. In construction of this list, a number of the descriptors used in the synonym condition were re-used in this condition but were selected across domains, such that participants will not see the same word twice.

Structural condition. To construct the list for the structural condition, the target list was reused, once in upper-case and once in lower-case. Again, participants will not see a target word more than once. In contrast, the same six buffer words are held constant across all five lists (see section below on Primacy and Recency). All five lists are presented in Table 4 and are color coded by domain (Introversion=light purple, Extroversion=dark purple; Openness/Intellect hi=light green; low=dark green), and function (orienting words=orange; buffer=blue).

Stimuli Randomization

To help ensure that each participant (a) provided a rating on all adjectives, with (b) equal exposure to each cue condition, and (c) to reduce the likelihood of response sets, the methodology of Myers, Lynch, and Bakal (1989) was heavily consulted, in addition to the eight studies cited previously, with particular emphasis on Rogers, , et al., (1977).

The randomization procedure operated such that all participants were shown an identical list of target words, but the order of the word list varied by participant. Additionally, each target word appeared in only one of the three encoding conditions (i.e., structural, semantic, or self-referent) and the assignment of each word to a condition was determined at random by DirectRT (2012), the proprietary software utilized for data collection.[11]

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[11] Future investigations will seek to employ a counterbalanced presentation of item blocks, as there is a need to control for item-response sets (or Condition X item-response sets), and more generally to measure any systematic effects of this first list of words on participants' processing and later retrieval.

Given the finding noted by Rogers, et al., (1977) that yes-rated items are generally recalled to a greater degree than no-rated items, one synonym and one structural cue were designed to illicit a yes response and one synonym and one structural cue designed to illicit a no response. As noted by Rogers, et al., (1977), it is impossible to have experimental control over yes and no responses in the self-referent condition, because the person's view dictates the response. Appendix A provides an overview of the procedure employed to generate a random distribution of the Yes and No responses.

Controlling for Unintended Memory Effects

Primacy and Recency. To address potential concerns of memory effects related to primacy and recency, an additional six adjectives were selected to serve as buffer items (see Table 4). The content of the buffer items was based on three factors: average ratings on the Anderson scale norms of likability; lack of perceived resemblance to any of the Big-5 domains; lack of apparent salience to borderline-personality pathology.

Timing of Trials. Of the total 16 self-referent/semantic (synonym) paradigms reviewed by Symons & Johnson (1997), only one provided a detailed account of the timing of its trials, Bargh & Tota (1988) ($d = 1.37$; 95% CI = 0.76 - 1.97). In the methodology of Bargh and Tota (1988), each trial began with the message "Next trial follows," which appeared for 1 second on the screen, followed by a 1 second pause, during which the screen was blank. Next, the question to be answered regarding the upcoming stimulus item was presented (at the top of the screen), and 1 second later the stimulus item was presented (underneath the question).

Participants made their response and, after an additional pause, such that the total duration

of each trial was 7 seconds, notification was given of the next trial (i.e., "Next trial

follows"). In contrast to Bargh and Tota (1988), more current technology allows the

presentation of multiple stimuli on the same screen, which makes it possible to have

significantly smaller inter-stimulus intervals. Moreover, while Bargh and Tota (1988)

utilized a fixed duration for stimulus presentation (i.e., 7 seconds), the purpose of the

duration primarily was related to their specific methodology. Similar to the discussion

above regarding item depth and breadth (see footnote 7), there is something of a

discrepancy in the literature on whether there is a concern that memory effects might be

related to the amount of time spent processing words. To that point are study designs

where the structural task takes *longer* than the semantic task, but participants still recall

more words from the semantic condition than the modified shallow condition. However,

many authors continue to treat time as a potential confound, so while a fixed presentation

is not a necessary design feature, measuring the amount of time participants spend

processing items (response time) is good practice. With these considerations in mind, the

current design was informed by the methodology outlined by Bargh and Tota (1998).

In the current design, first the question appeared on the screen (e.g., does this word

describe you?"), with an initial average load time of 55 milliseconds (ms). The question

remained on the screen for 489 ms before the stimulus appeared (underneath the question).

Both the question and stimulus remained on the screen together for an additional 489 ms

before the response options appeared (underneath the stimulus). Participants then had a total

of 4000 ms to indicate their response, pressing 1 for yes or 2 for no. The total maximum

time for each que was approximately 5000 ms—989 ms for the cumulative interval time and a variable response window ranging up to 4000 ms. In the current write up, participant response times do not include the interval time; that is, accrual begins when the response options ("press 1 for yes or 2 for no") appear on the screen and accrual ends when the participant selects their response option or fails to select an option and the system times out.

Brief Review and Aims

The goal of the current project was to develop and refine a performance-based paradigm to assess identity coherence by relating self-referent memory performance to self-report markers of BPD features of identity disturbance. Based on 40 years of results indicating that the self can serve as an active and powerful role in processing personal data, and going beyond previous examinations of the *content* of the self within groups conceptualized as manifesting problems in identity, the focus of the current line of inquiry was to examine whether individual differences in putative self-concept coherence can be reliably associated with differences in incidental recall, within a SR- semantic comparison design. Moreover, given there *is* evidence of a diminished self-reference effect in groups conceptualized as manifesting problems in identity, such as Autism and Schizophrenia it is reasonable to engage the following line of inquiry: It is to be investigated whether individuals elevated on BPD symptomatology, who demonstrate problematic identity involving a characteristic lack of sense of self, will be less likely to show the typical memory enhancement from self-reference judgments in a self-reference paradigm. If indeed there is a reduced SR Effect for people with BPD symptoms, this supports the contention that the structural organization hypothesized to provide the depth of processing

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benefit identifiable for most individuals is less well- developed or articulated. In other words, these individuals may not show the typical SRE because of a deficit in the coherence of self-structure, which precludes the additional depth of processing thought to explain the enhanced recall. The proposed research represents an innovative first step in establishing the promise of this paradigm for assessing structural aspects of identity and self-concept

Note Regarding Group Formation

The current line of inquiry examines whether individual differences in putative self-concept coherence can be reliably associated with differences in incidental recall performance, within a SR-semantic comparison design. Self-concept coherence is here operationalized by the problematical identity subscale of the borderline features subscale of the Personality Assessment Inventory (PAI-BOR-I) (for more information on the measure, see the Assessment section below on the PAI-BOR-I and for the items of which the identity subscale is comprised, see Appendix C.) The rationale for identifying differences in identity functioning followed from the deviation scores around the statistical mean of the BOR-I. In studies utilizing the PAI-BOR for selection criteria in group formation, it is customary to create two groups based on normative and non- normative tscores, where non-normative usually refers *only* to elevated scores, that is, scores generally at least 1 standard deviation above the mean are labeled "high BOR" and all other scores are labeled "low BOR" or "norm BOR." The current investigation, however, employed an exploratory technique by implementing two cut points, i.e., three groups were formed—a normative group based on scores *within* the standard deviation band (+1/-1), a "high BOR" group

comprised of scores above the standard deviation band (> +1), and a "low BOR" group

comprised of scores below the standard deviation band (< -1). More specifically, in the

current data set, three groups were formed by implementing two "cut points" based on

deviation scores from the mean score of a college sample ($N = 222$, $M = 55.40$, $SD =$

10.99). The finding that the mean in a college sample on BOR-I ($N = 222$, $M = 55.40$, $SD =$

10.99) is roughly 5-points higher than an adult sample is thought to reflect those

considerations outlined by Erickson and others; namely, that identity fluctuation is

normative for a college-aged sample, as college-age is an appropriate time for self-

exploration, and the salience of these identity- related concerns are reflected by the elevated

mean and slightly expanded deviation band (+.99). As such, one group was formed based

on tscores exceeding 64, which is roughly 1.5 standard deviations above community

participant means and 1 standard deviation above the mean for a community sample (an

adult population). Individuals from a college-aged sample with t-scores exceeding 65, can

be thought of as reliably elevated on indicators of problematical identity functioning (i.e.,

identity diffusion), diagnostically relevant to Borderline Personality Disorder. This group

was labeled Diffuse Identity. A second group was formed based on t-scores representing

non-problematical identity functioning (i.e., t-scores ranging from 46-64, or within roughly

1 standard deviation of the mean for college-aged community participants. This group was

labeled Flexible Identity. Given that college is a time when identity exploration is

normative, the rationale for identifying the third group emerged from those considerations

highlighted by Erickson; namely, that healthy identity development requires sufficient

Identity flexibility to confront different possible "selves," and try out new "roles," and

sufficient Identity strength to experience the resulting crisis of mismatch between how one feels about oneself verses how one is experienced by the surrounding world, or the hopes and desires of the individual verses the expectations and demands of others. Given these considerations, t scores indicating below average fluctuations may be suggestive of rigidity, or weakness, of self-structure, and if present, it stands to reason that such structural characteristics may alter the use of the self as a mnemonic device, and subsequent recall within a SRE paradigm. As such, the current investigation explored t scores below 45 as an additional construct of interest. In contrast to the diffuse and disorganized (high) and the normatively flexible (Norm), this group was labeled Rigid Identity. Appendix B provides a complete outline and rationale of the assessments proposed for use, and group-formation procedures intended to be employed, for future (non-pilot) data collection efforts.

*Note Regarding Hypothesis 3 and 4: Time

Mentioned above (see Method, Timing of Trials), the amount of time participant's spend processing items is often treated as a potential confound that must be "dissociated" from the "depth" of item processing. However, given one of the hypothesized mechanisms of action for the Self-Reference task is the schematic- processing ability of the Self, namely, to hierarchically organize and encode information based on perceived self-relevance, the current investigation, explored processing time as a legitimate variable of interest –exploring whether group differences emerged in the amount of processing time taken (regardless of later recall), or the amount of processing time needed to facilitate later recall.

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Hypotheses

Hypothesis 1: Consistent with the literature on processing conditions and previous findings on the SRE, it was hypothesized that the number of words accurately recalled would differ across the three encoding conditions. Specifically, the Self- Referent Condition producing the highest recall, followed by the Semantic Condition, followed by the Shallow Condition.

Hypothesis 2: The SRE will differ by identity group status (Diffuse, Flexible, Rigid). Specifically, the (normative) Identity-Flexible group will show a larger SRE than the other Groups.

Hypothesis 3: Consistent with the literature on processing conditions and previous findings on the SRE, it was also hypothesized that the time spent encoding words that later are accurately recalled would differ across the three processing conditions.

Hypothesis 4: As a reflection of the differences in the functioning of the Self Structure, it was hypothesized that the amount of *time needed* to process words, sufficient to facilitate recall, would differ across the groups.

METHODOLOGICAL APPROACH

The institutional review board of Texas A&M University approved the study protocol, and all participants provided responses to indicate their informed consent to participate in the study.

Participants

Participants ($n = 11$) were recruited through the undergraduate psychology student subject pool at Texas A&M. All participants were informed that the experimental session would last approximately two hours and all participants received four research credits in exchange for their participation. Informed Consent was administered by the experimenter, and all portions of the paradigm were administered through the computer software DirectRT (Jarvis, 2012). The sample consisted of 11 people (6 females, 5 males), with an average age of 19 ($M = 19.36$, $SD = 1.29$).

Assessment Materials

Appendix B provides the complete overview of the assessment materials intended for use as well as their manner of use in the full design. For the current pilot investigation, the following subset of materials were employed, and the full sample completed only the 24 items which comprise the Borderline Features Subscale of the PAI, as well as the 9-items measuring Borderline Personality Disorder pathology of the PDQ. (See Appendix C for the relevant items.)

Personality Assessment Inventory (PAI). The PAI (Morey, 1991)—a 344-item self-report inventory—provides a broad measure of psychopathology potentially relevant to the current study. Participant responses are measured on a 4-point scale including "False," "Not at all True," "Mostly True," and "Very True," and response patterns are converted to t-scores (which have a mean of 50 and a standard deviation of 10), scaled relative to normative and clinical population standardization data. The 24-items which comprise the Borderline Features (BOR) scale consists of four subscales—Affective Instability, Identity Disturbance, Negative Relationships, and Self-Harm. These subscales correspond to the core components outlined by the DSM-IV/DSM-5-II (APA, 2000; APA, 2013). The BOR scale in isolation has been found to distinguish borderline patients from unscreened controls with an 80% hit rate, and successfully identified 91% of these subjects as part of a discriminant function (Bell-Pringle et al., 1997). Classifications based upon the BOR scale in college students have been validated in a variety of domains related to borderline functioning, including depression, personality traits, coping, Axis I disorders, and interpersonal problems (Chapman et al., 2008; Trull, 1995; Trull, Useda, Conforti, & Doan, 1997). Additionally, as noted by Hopwood, Zimmerman, Pincus and Kruger (2016), a recent study by Sharp et al. (2015) provides substantial empirical support for the longtime suggestion (cf., Kernberg, 1984) that *DSM* BPD criteria are perhaps more aptly conceptualized as g*eneral indicators of personality pathology* (akin to g in intellectual functioning).

Personality Diagnostic Questionnaire-4 Borderline Personality Disorder Scale

(PDQ-4 BPD; Hyler, 1994). The PDQ-4 is a 100-item self-report measure of DSM-IV personality disorders. There are nine items assessing the 9 DSM-IV/DSM-5-II criteria for borderline personality disorder, 8 of which are true/false and one item (measuring the domain of impulsivity) consists of 6 true/false sub-items, two or more of which must be endorsed to trigger item-level endorsement. The PDQ-BOR offers both categorical diagnostic utility and dimensional assessment utility. Under DSM-IV/DSM5, Section II guidelines, meeting criteria for BPD requires clinician-endorsement of 5 of the 9 criteria. Therefore, when used as a self-report measure to screen individuals for the disorder, endorsement of at least 5 of the 9 items from the PDQ-BOR is considered suggestive of being at-risk for the disorder. As a diagnostic tool, the PDQ-4 has demonstrated adequate reliability and convergent validity with other self-report measures (e.g. Trull, Widiger, Lynam, & Costa, 2003) and structured interviews of BPD (Hyler, Skodol, Kellman, Oldham, & Rosnick, 1990).

Procedure

When participants arrived at the laboratory, they were escorted to private computer stations, where the experimenter took them through the process of informed consent. Following informed consent, an incidental recall paradigm was established by informing participants that the purpose of the study is to investigate the characteristics of common words, and that their task is to rate a set of trait adjectives. Specifically, participants were informed: *You will be asked to rate the appearance and the meaning of approximately 60 words. You will also be asked to complete roughly 450 questionnaire items about*

your mood and behavior, as well as items related to your personality. All of this will be

completed in a single session, at a private computer. It will take approximately two hours

to complete, and you will be compensated with four research credits. Participants were

given the opportunity to ask questions, if applicable, and then the computer-administered

portion began. Appendix D presents the series of interactive images that were used to

warm participants to the procedure and provide an overview of the three types of questions

they would encounter. Following the overview, participants were taken through a practice

session, which included the three types of questions they would encounter; for those three

trials (questions) all participants saw the same three *stimuli* (words), each paired with one

of the cue *conditions* (questions); namely, one structural cue, one semantic (synonym) cue,

and one self-referent cue. While the results of the practice sessions are recorded, they are

not included in the final analyses, as they serve to buffer against "primacy" effects. After

the primacy trials, all participants were exposed to 33 stimuli; the condition in which any

particular stimuli appeared differed across participants and was determined at random (i.e.,

whether the word was presented in the self-referent, semantic or shallow conditions). In

response to each question, the participant indicated their response by hitting either a "1"

for "yes" or "2" for "no." After providing ratings for the 33 target stimuli, all participants

were presented with the final three stimuli, which functioned as "Recency" trials, or

"buffers." As with the primacy trials, all participants saw the same three stimuli (words)

paired with one structural cue, one semantic (synonym) cue, and one self-referent cue.

Immediately after participants provided their responses for the full set of stimuli,

participants were prompted: *Please inform the experimenter that you have finished.*

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At which point, the experimenter said: *Thank you for your responses. For the next 5 minutes, please try to remember as many of the words as you can. Write down all the words you saw—the big green words—as many as you can remember, in the order that you remember them. Please continue to number the spaces for the words. When you are finished, please let me know*. Each participant was then handed a sheet of paper, which reiterated the directions given verbally. Following completion of the incidental free recall task, participants completed the battery of self-report questionnaires, including the 24 items from the BOR scale, which itself includes the 6 items providing a measure of problematical identity functioning (BOR-I). Additionally, participants provided responses on the 9 items measuring Borderline Personality-pathology from the Personality Diagnostic Questionnaire for DSM-IV (PDQ-BPD). The battery was administered at the same computer station where they completed the paradigm.

Preparing Data for Analysis

As is customary throughout the cognitive sciences, the *buffer adjectives* added to each list to minimize primacy and recency effects upon recall were dropped prior to data analyses. In scoring the recall protocols for each participant, determinations regarding grammatical *transformations* (i.e., errors) were made. For example, if the target word was Active, "Activ" was not considered a transformation, but "Inactive" was considered a transformation, and such transformations were scored as incorrect.

To begin, the handwritten responses for each participant (recalled item sets) were organized with VBA variants of Excel's conditional if-then logic statements (If/Thens)

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and Array functions (Arrays), which perform calculations on multiple sets of values, and can be used to link If/Thens. First, a Vlookup array was used to cross verify the list of recalled words with the list of target stimuli actually shown. *If* the participant's response was indeed one of the target stimuli, and not a primacy or recency item, the Vlookup returned a table with the following values: the recalled word in the form it appeared to the participant, the condition the word appeared within (Self, Semantic, or Structural), the participant's indicated response (yes or no), the response time (understood as the amount of time which elapsed between when the stimulus appeared on the screen and when the participant provided their response by hitting the number one or number two key on the keyboard), as well as additional measures not central to the current investigation. Proportions were calculated for the number of words recalled, relative to the total number. For example, in the Self Condition, participants are asked "Does this word describe you?" and participants respond either Yes or No. The total number of times the participant says yes to the question "Does this word describe you?" serves as the denominator, and the numerator consists only of those words which are later correctly recalled by the participant when answering yes to the question "Does this word describe you?" This resulted in 6 conditions, namely, Self-Yes, Self-No, Semantic-Yes, Semantic-No, Structural-Yes, Structural-No. Next If/Thens were used to collect and average participant response times, across all six conditions. One set of response times was calculated for the average processing time regardless of later recall and another set was calculated for the average processing time only for words later accurately recalled.

        Notably, to calculate the Self-Reference Effect, the proportion of words accurately

recalled Semantic Processing condition was subtracted from the proportion of words accurately recalled in the Self-Referent condition.

Groups

The current line of inquiry examines whether individual differences in putative self-concept coherence can be reliably associated with differences in incidental recall performance, within a SR-semantic comparison design. Self-concept coherence is here operationalized by the PAI-BOR-I, and the rationale for identifying differences in identity functioning followed from the deviation scores around the statistical mean of the BOR-I. Specifically two "cut points" were made, serving to demarcate three groups.

These cut points were roughly grouped based on deviation from the mean score in a college sample. The finding that the mean in a college sample on BOR-I ($N = 222$, $M = 55.40$, $SD = 10.99$) is roughly 5-points higher than an adult sample is thought to reflect those considerations outlined by Erickson and others; namely, that the nature of identity fluctuation is normative for a college-aged sample, as college-age is an appropriate time for self-exploration, and the salience of these identity-related concerns are reflected by the elevated mean and expanded deviation band. One group was formed based on tscores exceeding 64, which is roughly 1.5 standard deviations above community participant means and 1 standard deviation above the mean for a college-aged community sample. Individuals from a college-aged sample with t-scores exceeding 65, can be thought of as reliably elevated on indicators of problematical identity functioning (i.e., identity diffusion), diagnostically relevant to Borderline Personality Disorder. This group was labeled Diffuse Identity. A second group was formed based on t-scores

representing non-problematical identity functioning (i.e., t-scores ranging from 46-64, or within roughly 1 standard deviation of the mean for college-aged community participants. This group was labeled Flexible Identity**.**   As t-scores indicative of below average fluctuations in identity may be suggestive of a restriction in the range of self exploration, a third group was identified based on t-scores below 45, to investigate excessive structural rigidity as an additional classification of problematical identity. This group was labeled Rigid Identity.

Preliminary Analyses

An overview of symptom-relevant participant characteristics is presented in Table 6. A cursory examination of participant performance by gender suggested that of the four BOR subscales, endorsement rates across gender were only significantly different on measures of negative affect (BOR-N) $t(9)= -2.68$, $p = .025$, $\eta^2 = .44$, with women ($n = 6$) ($M = 64.00$, $SD = 9.70$), endorsing higher levels than men ($Mmen = 50.00$, $SD =7.33$).

Word Recall

Table 7 presents the bivariate correlations for the community-normed T Scores of the BOR and BOR-I with Word Recall, for the Self-Referent, Semantic, and Shallow Conditions, broken down by Yes/No responses. While none of the correlations reached statistical significance, the lack of significance is difficult to interpret given the sample size ($N = 11$). The strongest relationships with the identity subscale were with unanticipated variables. The relationships for BOR-I with Semantic-No ($r = -.38$) and Yes conditions ($r = .28$) was stronger than the corresponding relationships with the overall Borderline Scale (No $r = -.19$; Yes $r = .18$). As mentioned above, BOR-I is one of the 4 subscales of BOR, and so any correlations with the identity subscale larger than the borderline scale would suggest that, of the array of symptomatology captured by BOR, it is likely the identity component driving the relationship. Although small, these findings provide the first suggestion of a unique relationship between identity functioning and behavioral performance on a Self-Reference task.

As shown in Table 7, there is a pattern of positive and negative r-values across the Yes and No subgroups, in the Semantic/Structural Conditions, respectively, that may artificially be reducing the appearance of a relationship when forming the Composite Conditions. While the identical pattern is not seen with the Self-Yes ($r = -.08$) and Self-No conditions ($r = -.19$), the finding that the strength of the relationship between the identity subscale and the composite Self-Reference Condition ($r = -.07$) is even smaller than either of the sub-conditions of which it is entirely comprised would suggest that this same pattern may indeed be present.

To examine word recall, 3X3 mixed Analysis of Variance (ANOVA)[12] was conducted, with identity group (Diffuse, Flexible, Rigid) as the between-subjects factor, and task condition (Self-Referent, Semantic, Shallow) as the within-subjects factor. Consistent with hypothesis 1, there was a main effect of Condition on the proportion of words recalled, $F(1, 10) = 21.80$, $p = .002$; $\eta_p^2 = .73$, indicating there was indeed a memory effect generated by the paradigm, and the observed power to detect this effect was .98.

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[12] Technically, this a repeat measures or a "time series" design, which begins at the level of examining whether there are group differences in performance across the three conditions (the "time" element). Given the design, the main effect of "time" is technically a within-subjects contrast, addressing whether the scores of the groups differ across the conditions. The interaction term then addresses whether the groups progress at different rates "over time" (i.e., across the three conditions)—that is, do the groups differentially differ across conditions.

Table 8 presents details on the average recall generated by the three conditions. As shown in Table 8, recall was highest for words processed in the Self-Referent Condition ($M = .38$, $SD = .14$), compared to the Semantic ($\Delta\mu = .10$, $p = .034$)[13] and Shallow Condition ($\Delta\mu = .27$, $p = .002$). Recall for words processed in the Semantic Condition ($M = .28$, $SD = .09$) was also higher than recall for words processed in the Shallow Condition ($\Delta\mu = .17$, $p = .002$). These findings provide support for hypothesis 1 that the number of words accurately recalled would differ across the three encoding conditions, with the Self-Referent Condition producing the highest recall, followed by the Semantic Condition, followed by the Shallow Condition. Moreover, these findings are consistent with the literature on processing conditions and previous findings on the SRE.

The interaction between identity-group and task condition was not significant $F(2, 10) = .60$, $p = .574$; $\eta_p^2 = .13$. However, as shown in Figure 1 and Table 10, the Self-Reference Effect was greater for the Flexible Identity (normative) group ($\Delta\mu = .12$, $p = .061$) than for the Rigid ($\Delta\mu = .10$, $p = .188$) or Diffuse groups ($\Delta\mu = .07$, $p = .351$) (see also Table 11), and despite the small sample size, approached significance only for the Flexible Identity (normative) group ($\Delta\mu = .12$, $p = .061$, HedgesGav=1.12, CL ES = .86) . These findings provide preliminary support for Hypothesis 2 and underscore the potential utility of an SR-Semantic paradigm for use as a behavioral indicator of identity functioning.

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[13] This is the overall Self-Referent Effect.

The Effect of Yes and No

Following Rogers, Kuiper and Kirker (1977), it is not uncommon for investigations of the Self-Reference Effect to consider the effect of Yes and No responses on subsequent recall. In the present investigation, these analyses would have been premature, given the small sample and missing data for entire categories. In lieu of full analyses, a table of effect sizes for mean differences is presented in Table 12 and Figure 2.

Response Time

Table 13 presents the bivariate correlations for the BOR and BOR-I Scales of the PAI (normed t-scores) with participants' average overall processing time, and Table 14 presents the bivariate correlations for the same PAI scales with participants' average processing time on accurately recalled items. Across both tables, the absolute values for the full range of *r* extend from .01 to .51 for BOR (overall *M r* = .24, Median *r* = .25) and .05 to .55 for BOR-I (overall *M r* = .26; Median *r* = .23). There appears to be stronger relationship between the identity subscale and the average processing time on accurately recalled items (Table 14: Identity *M r* = .32), than with the overall processing time (Table 13: Identity *M r* = .20). One possible interpretation of this finding is that there are differences in the amount of time needed to process items that are later accurately recalled, based on standing on BOR-I. The strongest relationship, however, with the identity subscale is with the Overall Time and Self-No *r* = -.55, *p* = .077, which, in addition to approaching significance, demonstrates a stronger relationship than the corresponding r for the Borderline scale *r* = -.51, *p* = .108.

One possible interpretation of this finding is that higher levels of identity diffusion are associated with quicker processing times when deciding that an item is not self-referent. Given the previously described relationship between BOR and BOR-I, these findings would suggest that, of the array of symptomatology captured by the PAI, the association here suggested between quicker processing times and No-responses on the self-referent task are likely driven by the identity component.[14]

An analysis of the time spent considering words that were later recalled was conducted with a mixed ANOVA, with identity group (Diffuse, Flexible, Rigid) as the between-subjects factor, and task condition (Self-Referent Time, Semantic Time, Shallow Time) as the between-subjects factor. Mauchly's test of the homogeneity of variance approached significance ($p = .095$). There was a significant main effect (quadratic) of task condition $F(1, 10) = 9.011$, $p = .017$, $\eta_p^2 = .53$. Participants spent more time processing words in the Semantic Condition than in the Self ($\Delta\mu = 669.44$, $p = .012$) or Shallow Conditions ($\Delta\mu = 775.68$, $p = .027$). Participants spent roughly equivalent amounts of time ($\Delta\mu = 106.23$, $p = .509$) in the Self ($M = 1010.27$, $SD = 612.08$) and Shallow Conditions ($M = 1065.52$, $SD = 486.73$). As such, Hypothesis 3 was not supported. There was a marginally significant linear trend for the interaction

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[14] Additional data would be useful for examining the relationship between time spent and actual words recalled, to examine whether it was merely the case that less time was spent, potentially implying a kind of dismissiveness of self-relevance; or whether less time was needed, potentially implying the presence of an increased familiarity with what or who one is not, rather than who or what one is.

between task condition and group, $F(2, 10) = 3.36$, $p = .087$; $\eta_p^2 = .457$. Table 16

presents effect sizes for the differences between the groups' response times across the

three conditions, where, notably, there is a trend in the Self Condition, contrasting the

Flexible with the Diffuse group ($\Delta\mu = 633.17$, $p = .088$) and in the Shallow Condition

there is a reliable difference contrasting the Flexible with the Rigid group ($\Delta\mu = 983.92$, p

$= .022$). An initial observation is that where the Conditions do not reliably differ is where

the groups are trending and/or do reliably differ (Flexible and Diffuse in the Self

Condition) and (Flexible and Rigid in the Shallow condition). The meaningfulness of this

is that in a time series design the usual analysis of interest is whether group scores change

over time (i.e., across conditions). In the current investigation, the analysis of interest is

whether the "condition scores" change as a function of the group differences—that is,

whether the deviation in the group's scores is large enough to, essentially, equate response

times that would otherwise be different. Here, the Self and Shallow Conditions—

Conditions that would normally be expected to diverge—are roughly equivalent. This

suggests that individual differences in identity functioning may be a notable factor in how

the groups approach the Self and Shallow tasks (as measured by processing time). More

specifically regarding the direction of the outlined group differences, although statistical

significance varied, the Diffuse identity group spent less time processing words later

recalled in the Self Condition than either the Flexible ($\Delta\mu = -633.17$, $p = .088$)

or Rigid groups ($\Delta\mu = -510.41$, $p = .198$). Moreover, the Diffuse group spent less time in

the Self Condition than in the Semantic[15] ($\Delta\mu = -1327.37$, $p = .009$) or Shallow Conditions

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($\Delta\mu$ = -194.15, p = .516). Contrasting these findings (regarding time spent) with the amount of words actually recalled, the relative patterns of difference between group performance are contrasted by comparing Table 16 (group   differences in words recalled, within conditions) with the current set (group differences in times for those recalled words).

In the Self-Referent Condition, the Flexible group remembered approximately .5 standard deviation more words than either the Diffuse or Rigid Groups (ds=.47; ds=.50, respectively), and the Diffuse and Rigid Groups were not appreciably different in recall (ds=.03). The Flexible group, however, spent nearly 1.5 standard deviations *more* time (ds=1.43) than the Diffuse group to recall .5 standard deviations more words (ds=0.47), and the Rigid group also spent nearly 1.5 standard deviations *more* time (ds=1.41) than the Diffuse group to recall slightly more words (ds=.03). While in all three cases, the groups roughly remember more words where they have spent more time, the suggested difference is in the relative amount of time spent on those words that are later recalled— as one might expect a greater "efficiency" in recall (i.e., more words in proportionally less time) for groups considered higher on functioning. While this pattern of findings certainly requires further testing with a larger sample, one potentially confounding

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[15] The most straightforward reason that the semantic condition would take longer to process is that the condition has a confound which has not been addressed by the literature—or is at least not a matter of common discussion, and to our knowledge the methodological implications of which have not been addressed, which are, namely: In the Semantic Condition, where one word is being compared to another, there are twice as many words to process as there are for the Self and Shallow-Conditions.

variable which will need to be measured and/or controlled for in any future examination,

is the amount of time participants spent actually recalling the words (i.e. writing them

down), which was not specifically recorded in the current (pilot) investigation, and which

appeared to differ, in some instances notably, across participant

SUMMARY AND DISCUSSION

The current project aimed to establish and refine a behavioral indicator of the coherence of personality structure, utilizing a cognitive paradigm theorized to tap the self-system—the Self Reference Effect. In the current investigation, the potential utility of this effect in identifying identity dysregulation was piloted. The preliminary findings suggested a pattern of enhanced performance for the normative identity group, who appeared to demonstrate a stronger mnemonic effect from the use of their self as an encoding strategy, relative to the two groups self-reporting indicators of problematical functioning. For the two problematical identity functioning groups, the use of the self does not appear to be as effective of a mnemonic device.

More specifically, the study design employed a self-referent paradigm, which contrasted a self-referent condition (i.e., does this word describe you?") against a semantic (synonym) control condition (i.e., "does this word mean the same as another word?"). The Self-Reference Effect was calculated as the difference in the words accurately recalled in the self-referent verses the semantic conditions. Identity dysregulation was measured by the identity subscale of the Borderline Features Scale of the PAI. Two cut points were made along this dimensional indicator of problematical identity functioning, which identified a normative group, an elevated group—considered informative of borderline personality symptomatology, and an exploratory group—self-reporting as markedly low on problematical identity functioning, and which, to our knowledge, is the first such

investigation with the PAI. Both word recall as well as response time were investigated across the three groups.

Regarding word recall, there is meta-analytically supported difference in word recall between the Self-Referent, Semantic, and Shallow conditions, where the different degrees of recall resulting from consideration of personal meaningfulness (Self), above general meaningfulness (Semantic), above "mere" reference (Shallow) are thought to relate to general meaningful, but also to personal meaningfulness—that is, the degree to which they tap the self. The preliminary findings suggested a pattern of enhanced performance for the normative identity group, who appeared to demonstrate a stronger mnemonic effect from the use of their self as an encoding strategy, relative to the two groups self-reporting indicators of problematical functioning; for the two problematical identity functioning groups, the use of the self does not appear to be as effective of a mnemonic device. The preliminary findings suggest that the self-reference effect (word recall in the Self minus Semantic Conditions) may be useful as an indicator of identity functioning.

While previous investigations have examined individual differences within a Self-Referent/Semantic paradigm, to our knowledge, participant response time has not been explored. Time spent processing items is often treated as a potential confound that must be "dissociated" from the "depth" of item processing. The current investigation explored whether putative differences could be reliably tied to performance within a self-reference paradigm, and given one of the hypothesized mechanisms of action for the Self-Reference task is the schematic-processing ability of the Self, namely, to

hierarchically organize and encode information based on perceived self-relevance, it was investigated whether differences would emerge in the approach taken to the conditions, based on identity functioning, or whether there were differences in the amount of time that was needed to process words in order to later recall them. Here, the preliminary findings also suggested that response time may be informative.

As noted by Kauffman (2014), although initial formation of identity largely takes place in youth, identity development is a lifelong task, and a basic understanding of development is required to distinguish pathological identity problems from normative identity confusion (Marcia, 2006). Kernberg claims (2004), that "the key anchoring point of the differential diagnosis of milder types of character pathology and neurotic personality organization, on the one hand, and severe character pathology and borderline personality on the other, is the presence of normal identity integration as opposed to the syndrome of identity diffusion." In demonstrating the utility of the Alternative Model to diagnose identity dysfunction in adolescents, Schmeck at al. (2015) note that identity diffusion is not just a symptom of BPD, but is one of the central features of all personality disorders. These points serve to highlight the importance of measuring identity—often considered an element of normative development—within a psychopathological framework. To go beyond a *merely* psychopathological framework, *a common framework* could improve identity-related research (Kauffman, et al., 2014), thereby providing additional developmental *and* clinical utility. As noted by Kerr, et al. (2015), if a clearer concept of the self were to emerge, disorders such as BPD could be reframed as pervasive and

complex disorders of the structure and function of the self;   moreover, such an approach

would be inherently dimensional and trans-diagnostic (*cf.* social-neurocognitive research

(e.g., see Murray, Schaer, & Debbané, 2012), with application for clinical assessment and

intervention. A number of theorists are inclined toward the view that the models of

borderline pathology serve as prototypes for more general models of personality pathology

(for example, see Clarkin et al., 2007 or Hopwood et al., 2015), and moreover, that

borderline personality is not a single diagnostic construct, per se, but rather a stage of

personality development common to all individuals (for a discussion within an object-

relations model, see Horner, 1995a; Horner, 1995b). Such a view might explain findings

from a review carried out by Adshead and Fonagy (2012), suggesting that disorders of self-

experience are common to many psychiatric disorders, and going so far as to suggest that

perhaps the reason that psychological therapies "work" on those disorders is that they work

on the self. Toward that end, this project serves to pilot for refinement a behavioral

indicator of the coherence of identity structure, hypothetically correlated with Self and

Identity functioning. The preliminary findings suggest that the self-reference effect (word

recall in the Self minus Semantic Conditions) may be useful as an indicator of identity

functioning. The preliminary findings also suggest that response time may be informative

as well. While an obvious limitation in the present investigation was its sample size, the

pattern of results appears sufficiently promising so as to warrant further study of the SRE

for measuring identity diffusion as it relates to borderline personality functioning,

specifically, as well as the broader aim of contributing to the measurement of identity

functioning.

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Table 1

Levels of Processing, Cue Questions and Associated
Responses: Rogers, et al., 1977, Experiment 1

Level of Processing	Cue Question	Answer		Manipulation
		Yes	No	
Structural	Big letters?			Either same size type or twice as large
Phonemic	Rhymes with?			Either rhymed or did not
Semantic (Synonym)	Means the same as?			Synonym or not
Self (Descriptive)	Describes you?			Participant-Determined

Table 2

Typical Questions and Associated Responses from Craik and Tulving (1975)

Level of processing	Question	Answer	
		Yes	No
Structural	Is the word in capital letters?	TABLE	Table
Phonemic	Does the word rhyme with WEIGHT?	Crate	Market
Category	Is the word a type of fish?	Shark	Heaven
Sentence	Would the word fit the sentence:	Friend	Cloud
	He met a_____in the street?		

Source: Craik, F. I., & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. *Journal of Experimental Psychology: General, 104(3)*, 268.

Table 3

Incidental Recall of Descriptive Self-Referent and Semantic Control Conditions

	d	lower	upper	Self	Sym	ML	TOP	PT	TET	TAR	Test	Dist	DV	N
Register & Kihlstrom (1987)	1.61	1.11	2.12	Desc	Syn	64	Item	UJ	0	5	Incid	Ab	Recall	40
Kendzierski (1980)	1.01	0.49	1.53	Desc	Syn	47	Item	UL	0	UL	Incid	Ab	Recall	32
Klein & Kihlstrom (1986 Exp 1)	0.99	0.36	1.62	Desc	Syn	54	Item	UL	1	5	Incid	Ab	Recall	22
Rogers et al. (1977 Exp 1)	0.98	0.46	1.5	Desc	Syn	48	Item	UL	0	3	Incid	Ab	Recall	32
Katz (1987)	0.98	0.69	1.27	Desc	Syn	84	Item	UJ	20	UL	Incid	Pr	Recall	103
Sutton et al. (1988)	0.73	0.25	1.2	Desc	Syn	60	Item	UL	2	3	Incid	Pr	Recall	36
Pullyblank et al. (1985, Exp 1)	0.58	-0.12	1.29	Desc	Syn	16	Item	UJ	1	UL	Incid	Pr	Recall	16
Pullyblank et al. (1985, Exp 2)	0.47	0.07	0.88	Desc	Syn	16	Item	UJ	1	UL	Incid	Pr	Recall	48
Average	0.919	0.414	1.426			49								41

Note. Effect sizes are positive for memory differences in the direction of the SR group. Ab= absent; Desc= descriptive; DV=Dependent Variable; Incid=incidental; Item= item specific; ML= memory load (in number of words); Pr = present; PT = presentation time (in seconds); Recall = free recall; Syn = synonym; TAR = time allowed for recall (in min); TET = time between encoding and memory test (in min); ToP = type of processing; UJ = unable to judge; UL = unlimited time for recall.

Table 4

Proposed Stimuli: Trials, Buffers, Self-Referent Targets, Synonyms, Unrelated Adjectives and Structural Variants

Target	Synonym	Unrelated	STRUCTURAL	Structural	Function
Meditative	Calm	Mathematical	MEDITATIVE	Meditative	Trial
Lucky	Fortunate	Mathematical	LUCKY	Lucky	Trial
Entertaining	Thrilling	Mathematical	ENTERTAINING	Entertaining	Trial
Fashionable	Trendy	Numerical	FASHIONABLE	Fashionable	Buffer
Comical	Funny	Numerical	COMICAL	Comical	Buffer
Able	Competent	Numerical	ABLE	Able	Buffer
Unartistic	Uncreative	Gutsy	UNARTISTIC	Unartistic	*Neg*
Bossy	Pushy	Cosmopolitan	BOSSY	Bossy	*Neg*
Domineering	Overbearing	Cunning	DOMINEERING	Domineering	*Neg*
Withdrawn	Retreated	Inquiring	WITHDRAWN	Withdrawn	*Neg*
Show-off	Exhibitionist	Traditional	SHOW-OFF	Show-off	*Neg*
Inhibited	Constrained	Illiterate	INHIBITED	Inhibited	*Neg*
Noisy	Boisterous	Ignorant	NOISY	Noisy	*Neg*
Forceless	Powerless	Analytical	FORCELESS	Forceless	*Neg*
Forceful	Commanding	Dense	FORCEFUL	Forceful	*Neg*
*Active	Lively	Cerebral	ACTIVE	Active	Neut
Energetic	Spirited	Contemplative	ENERGETIC	Energetic	Neut
Outspoken	Vocal	Talented	OUTSPOKEN	Outspoken	Neut
Talkative	Chatty	Atypical	TALKATIVE	Talkative	Neut
Simple	Straightforward	Boisterous	SIMPLE	Simple	Neut
Bright	Smart	Muted	BRIGHT	Bright	Neut
Broad-minded	Cosmopolitan	Restrained	BROAD-MINDED	Broad-minded	Neut
Civilized*	Cultured	Sheepish	CIVILIZED*	Civilized*	Neut
Curious	Exploring	Noiseless	CURIOUS	Curious	Neut
Wise	Enlightened	Retreated	WISE	Wise	Neut
Sophisticated	Refined	Reclusive	SOPHISTICATED	Sophisticated	Neut
Unconventional	Atypical	Constrained	UNCONVENTIONAL	Unconventional	Neut
Inventive	Innovative	Feeble	INVENTIVE	Inventive	Neut
Inquisitive	Interested	Coy	INQUISITIVE	Inquisitive	Neut
Clever	Astute	Prudent	CLEVER	Clever	Neut
Artistic	Crafty	Submissive	ARTISTIC	Artistic	Neut
Creative	Resourceful*	Powerless	CREATIVE	Creative	Neut
Logical*	Rational	Afraid	LOGICAL*	Logical*	Neut
Reflective	Thoughtful	Fearless	REFLECTIVE	Reflective	Neut
Enthusiastic	Expressive	Knowledgeable	ENTHUSIASTIC	Enthusiastic	Neut
Sociable	Friendly	Scholarly	SOCIABLE	Sociable	Neut
Outgoing	Gregarious	Rational	OUTGOING	Outgoing	Neut
*Adventurous	Brave	Unreasonable	ADVENTUROUS	Adventurous	Neut
Social	Extraverted	Straightforward	SOCIAL	Social	Neut
Individualistic	unique	Lively	INDIVIDUALISTIC	Individualistic	Neut
Imaginative	Open	Vocal	IMAGINATIVE	Imaginative	Neut
Philosophical	Semantic	Confident	PHILOSOPHICAL	Philosophical	Neut
Intelligent	Sharp	Courageous	INTELLIGENT	Intelligent	Neut

Intellectual	Scholarly	Pushy	INTELLECTUAL	Intellectual	Neut
Questioning	Inquiring	Overbearing	QUESTIONING	Questioning	Neut
Conventional	Traditional	Evident	CONVENTIONAL	Conventional	Neut
*Bold	Courageous	Smart	BOLD	Bold	Neut
Daring	Gutsy	Cultured	DARING	Daring	Neut
Firm	Unshakable	Visionary	FIRM	Firm	Neut
Timid	Sheepish	Thoughtful	TIMID	Timid	Neut
Unaggressive	Gentle	Uncreative	UNAGGRESSIVE	Unaggressive	Neut
Assertive	Confident	innovative	ASSERTIVE	Assertive	Neut
Shy	*Hesitant*	Refined	SHY	Shy	Neut
Persistent	Determined	Indifferent	PERSISTENT	Persistent	Neut
Reserved	Restrained	Customary	RESERVED	Reserved	Neut
Quiet	Silent	Narrow interests	QUIET	Quiet	Neut
Unadventurous	careful	Dim	UNADVENTUROUS	Unadventurous	Neut
Righteous	Virtuous	Contemporary	RIGHTEOUS	Righteous	Buffer
Romantic	Amorous	Contemporary	ROMANTIC	Romantic	Buffer
Skilled	Gifted	Contemporary	SKILLED	Skilled	Buffer

Table 5

Example Affect, Likeability and Meaningfulness Ratings for a Sample List of Proposed Target Words

	ANEW (Rated 1-9)		Anderson (Rated 0-6)		Valence	Arousal	Dominance	Word		Likeability	Mean
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Freq.	Mean	(SD)	Ranked	
Active								455	0.65	356	
Adventurous								441	0.9	350	
Artistic								400	1.58	348	
Bold	6.8	-1.61	5.6	-2.21	6.67	-1.81	21	336	1.22	366	
Bright	7.5	-1.55	5.4	-2.33	6.34	-1.82	87	483	0.67	362	
Clever								496	0.56	370	
CONVENTIONAL								260	0.95	322	
CREATIVE								462	1.15	366	
Curious	5.02	-2.02	6.38	-1.78	4.93	-1.76	6	432	1.13	372	
Daring								360	1.03	358	
Enthusiastic								489	0.72	382	
FIRM								#N/A	#N/A	#N/A	
Inquisitive								225	0.94	358	
Intelligent								537	0.62	368	
Inventive								453	0.86	356	
Logical								465	0.76	370	
Outgoing								412	1.46	364	
OUTSPOKEN								313	1.77	362	

Persistent								347	1.66	382
Philosophical								386	1.78	326
Questioning								#N/A	#N/A	#N/A
Quiet	5.58	-1.83	2.82	-2.13	4.42	-2.3	76	311	0.91	376
RESERVED	4.88	-1.83	3.27	-2.05	4.3	-1.93	27	348	1	356
Shy	4.64	-1.83	3.77	-2.29	3.44	-1.96	13	291	0.89	376
Sociable	6.88	-1.82	4.98	-2.59	5.91	-2.07	380	429	0.85	360
Social								398	1.05	338
Sophisticated								372	0.95	332
Talkative								352	1.32	390
UNADVENTUROUS								212	0.93	356
Unaggressive								304	1.43	372
Unconventional								346	0.92	344

Table 6

Identity Group Standing on Borderline Personality Symptomatology as Measured by the PAI

	Rigid Identity Group				Flexible Identity Group				Diffuse Identity Group				Combined Identity Groups			
	M	*SD*	SE	Med	*M*	*SD*	SE	Med	*M*	*SD*	SE	Med	*M*	*SD*	SE	Med
BOR	42.33	4.04	2.33	40.00	60.40	5.86	2.62	59.00	69.00	7.21	4.16	67.00	57.82	11.84	3.57	59.00
BOR-I	41.00	0.00	0.00	41.00	57.20	1.64	0.74	56.00	72.00	7.55	4.36	71.00	56.82	12.52	3.78	56.00
BOR-S	46.33	8.33	4.81	49.00	59.60	11.67	5.22	60.00	59.00	1.73	1.00	60.00	55.82	10.30	3.11	57.00
BOR-N	46.33	5.77	3.33	43.00	64.20	9.93	4.44	59.00	59.00	9.00	5.20	59.00	57.91	11.08	3.34	56.00
BOR-A	42.00	5.20	3.00	39.00	51.40	5.59	2.50	50.00	65.00	2.65	1.53	64.00	52.55	9.99	3.01	50.00

Combined $N = 11$; Rigid Identity Group $n = 3$; Flexible Identity Group $n = 5$; Diffuse Identity Group $n = 3$

Table 7

Correlations for the PAI Borderline Scale and Identity Subscale with the Proportion of Words Recalled across Processing Conditions

	Self	Semantic	Shallow	Self Yes	Self No	Semantic Yes	Semantic No	Shallow Yes	Shallow No
Borderline Scale	-0.19	-0.04	0.47	-0.09	-0.35	0.16	-0.19	-0.46	0.47
Identity Subscale	-0.07	-0.05	0.19	-0.08	-0.19	0.28	-0.38	-0.34	0.26

Note. None of the correlations presented reached statistical significance. The Borderline Scale includes the Identity Subscale.
$N = 11$

Table 8

Means and Effect Size Estimates for Memory Effect Generated by the Three Conditions: Group Grand Means

Group	Condition		Memory Effect by Condition		μΔ	μΔ	*d*s	CL ES
Mean of All Groups	Self	0.37	Semantic	.27*	.1		1.85	.91
			Shallow	.11*	.26		3.40	.99
			Semantic	Shallow		-.16*	3.85	.99

Note. To calculate effect sizes, t values were derived from the mean differences and then divided by the standard errors of those differences. To aid interpretation of these differences, Table 8 presents also presents a *common language effect size* (CL ES) (Lakens, 2013; McGraw and Wong, 1992), which essentially converts the relevant Cohen's *d* statistic into a probability (or percent likelihood).

* $p < .05$

Table 9

Effect Size Estimates[1] Contrasting Group's Word Recall Performance Within Conditions

Condition	Identity Group Means				$\mu\Delta$	$\mu\Delta$	ds	CL Effect Size
Self	Flexible	0.42	Rigid	.35	.07		.50	.63
	Flexible	0.42	Diffuse	.35	.07		.47	.62
			Diffuse	Rigid		.01	.03	.51
Semantic	Flexible	.30	Rigid	.24	.06		.74	.70
	Flexible	.30	Diffuse	.28	.02		.16	.54
			Diffuse	Rigid		.04	.33	.59
Shallow	Flexible	.17	Rigid	.06	.12		1.64	.89
	Flexible	.17	Diffuse	.09	.08		1.24	.84
			Diffuse	Rigid[*]		.04	.94	.75

[*] $p < .05$

CL ES is a Common Language Effect Size, which can be calculated directly from Cohen's d, converts the effect size into a percentage. For between subjects designs, and expresses the probability that a randomly sampled person from one group will have a higher observed measurement than a randomly sampled person from the other group.

[1]Estimates were generated following the methodology outlined by Lakens (2013) through the use of his freeware, available at: https://sites.google.com/site/lakens2/effect-sizes

Table 10

Effect Size Estimate[1] Contrasting Group Performance Across the Self and Semantic Conditions

Effect	Condition Recall				SRE	Cohens dav	Hedges GAV	CL Effect Siz
	μSelf		μSemantic		Δ μSelf-μSemantic			
Rigid	Self	.35	Semantic	.24	.11	.77	.66	.74a
Flexible	Self	.42	Semantic	.30	.12†	1.24	1.12	.86a
Diffuse	Self	.35	Semantic	.28	.07	.44	.36	.64a

[1]Estimates were generated following the methodology outlined by Lakens (2013) through the use of his freeware, available at: https://sites.google.com/site/lakens2/effect-sizes

Table 11

Mean and Effect Size Estimates[1] for the Contrasts of Group's Self-Reference Effects

Effect	SRE Scores		SRE Contrasts			ds	CL ES
	Δ μSelf- μSemantic		Group Δ SRE / SRE				
SRE	Flexible	.12	Rigid	.11	.01	.16	.54
			Diffuse	.07	.05	.47	.62
	Diffuse		Rigid		.04	.25	.57

CL ES is a Common Language Effect Size, which can be calculated directly from Cohen's d, converts the effect size into a percentage. For between subjects designs, and expresses the probability that a randomly sampled person from one group will have a higher observed measurement than a randomly sampled person from the other group.

[1]Estimates were generated following the methodology outlined by Lakens (2013) through the use of his freeware, available at: https://sites.google.com/site/lakens2/effect-sizes

Table 12

Effect Size Estimates[1] Contrasting Groups' Word Recall Within Sub-Composite Conditions

Condition	Identity Group Means				μΔ	μΔ	*d*s	CL ES
Self Yes	Flexible	.40	Rigid	.32	.09		.38	.6
			Diffuse	.32	.08		.61	.68
			Diffuse	Rigid		-.01	.06	.52
Self No	Flexible	.52	Rigid	.42	.10		.5	.65
			Diffuse	.39	.13		.48	.62
			Diffuse	Rigid		-.028	.11	.53
Semantic Yes	Flexible	.47	Rigid	.	.50		1.53	.89
			Diffuse	.17	.30		.87	.74
			Diffuse	Rigid		.167	.82	.72
Semantic No	Flexible	.21	Rigid	.31	-.10		.79	.72
			Diffuse	.19	.02		.11	.53
			Diffuse	Rigid		-.128	.85	.73
Shallow Yes	Flexible	.08	Rigid	.26	-.18		.84	.69
			Diffuse	.11	-.03		.46	.62
			Diffuse	Rigid		-.142	.54	.65
Shallow No	Flexible	.42	Rigid	.	.42		1.37	.87
			Diffuse	.29	.13		.33	.59
			Diffuse	Rigid		.29	1.03	.77

[1]Estimates were generated following the methodology outlined by Lakens (2013) through the use of his freeware, available at: https://sites.google.com/site/lakens2/effect-sizes

Table 13

Bivariate Correlations for Overall Response Times, Independent of Word Recall, by Condition, with PAI scales

		Self Yes	Self No	Semantic Yes	Semantic No	Shallow Yes	Shallow No
Identity Subscale	*r*	-0.15	-0.55	-0.05	-0.08	-0.12	0.23
	p	0.66	*0.08*	0.88	0.82	0.72	0.50
	n	11	11	11	11	11	11
Borderline Scale	*r*	-0.04	-0.51	0.08	-0.01	0.13	0.25
	p	0.90	0.11	0.81	0.97	0.71	0.46
	n	11	11	11	11	11	11

Note. Sample sizes and p values are provided by condition, as word recall varies.

Table 14

Bivariate Correlations for Response Times for Accurately Recalled Words, by
Condition, with PAI scales

		Self Yes	Self No	Semantic Yes	Semantic No	Shallow Yes	Shallow No
Identity	*r*	*-0.30*	-0.39	0.24	0.32	-0.17	0.47
Subscale	*p*	0.37	0.27	0.65	0.40	0.74	0.28
	n	11	10	6	9	6	7
Borderline	*r*	-0.27	-0.42	0.23	0.34	-0.24	0.36
Scale	*p*	0.43	0.23	0.66	0.37	0.64	0.43
	n	11	10	6	9	6	7

Note. Sample sizes and p values are provided by condition, as word recall varies.

Table 15

Effect Size Estimates[1] Contrasting Groups' Recall Time Within Sub-Composite Conditions

Condition	Identity Group Means				μΔ	μΔ	*d*s	CL Effect Size
Self Yes	Flexible	1142.52	Rigid	839.33	303.18		1.04	.76
			Diffuse	Rigid		-207.94	.66	.68
Self No	Flexible	1400.87	Rigid	1458.50	-57.63		.08	.52
			Diffuse	735.20	665.67		.94	.79
			Diffuse	Rigid		-723.30	1.34	.86
Semantic Yes	Flexible	1673.54	Rigid	1431.50	242.04		.35	.64
			Diffuse	2182.00	-508.46		.73	.77
			Diffuse	Rigid		750.50	-	-
Semantic No	Flexible	2005.05	Rigid	1250.09	754.97		.94	.79
			Diffuse	2075.11	-70.06		.07	.52
			Diffuse	Rigid		825.03	.82	.75
Shallow Yes	Flexible	1206.33	Rigid	314.00	892.33		1.14	.87
			Diffuse	467.50	738.83		1.08	.8
			Diffuse	Rigid		153.50	.43	.67
Shallow No	Flexible	1674.30	Rigid	949.25	725.05		.84	.75
			Diffuse	1563.00	111.30		.12	.55
			Diffuse	Rigid		613.75	1.11	.87

[1]Estimates were generated following the methodology outlined by Lakens (2013) through the use of his freeware, available at: https://sites.google.com/site/lakens2/effect-sizes

Table 16

Effect Size Estimates[1] Contrasting Groups' Recall Time Within Composite Conditions

Condition	Identity Group Means				μΔ	μΔ	ds	CL Effect Size
Self	Flexible	1271.69	Rigid	1148.92	122.77		.25	.57
			Diffuse	638.51	633.18†		1.43	.87
			Diffuse	Rigid		510.41	1.41	.84
Semantic	Flexible	1791.01	Rigid	1310.56	480.45		.97	.75
			Diffuse	1965.89	-174.88		.23	.55
			Diffuse	Rigid		-655.33	.81	.72
Shallow	Flexible	1445.84	Rigid	461.92	983.92*		2.57	9.6
			Diffuse	832.67	613.17		1.25	.79
			Diffuse	Rigid		-370.75	.65	.68

*$p < .05$
† $p = .08$

CL ES is a Common Language Effect Size, which can be calculated directly from Cohen's d, converts the effect size into a percentage. For between subjects designs, and expresses the probability that a randomly sampled person from one group will have a higher observed measurement than a randomly sampled person from the other group.

[1]Estimates were generated following the methodology outlined by Lakens (2013) through the use of his freeware, available at: https://sites.google.com/site/lakens2/effect-sizes
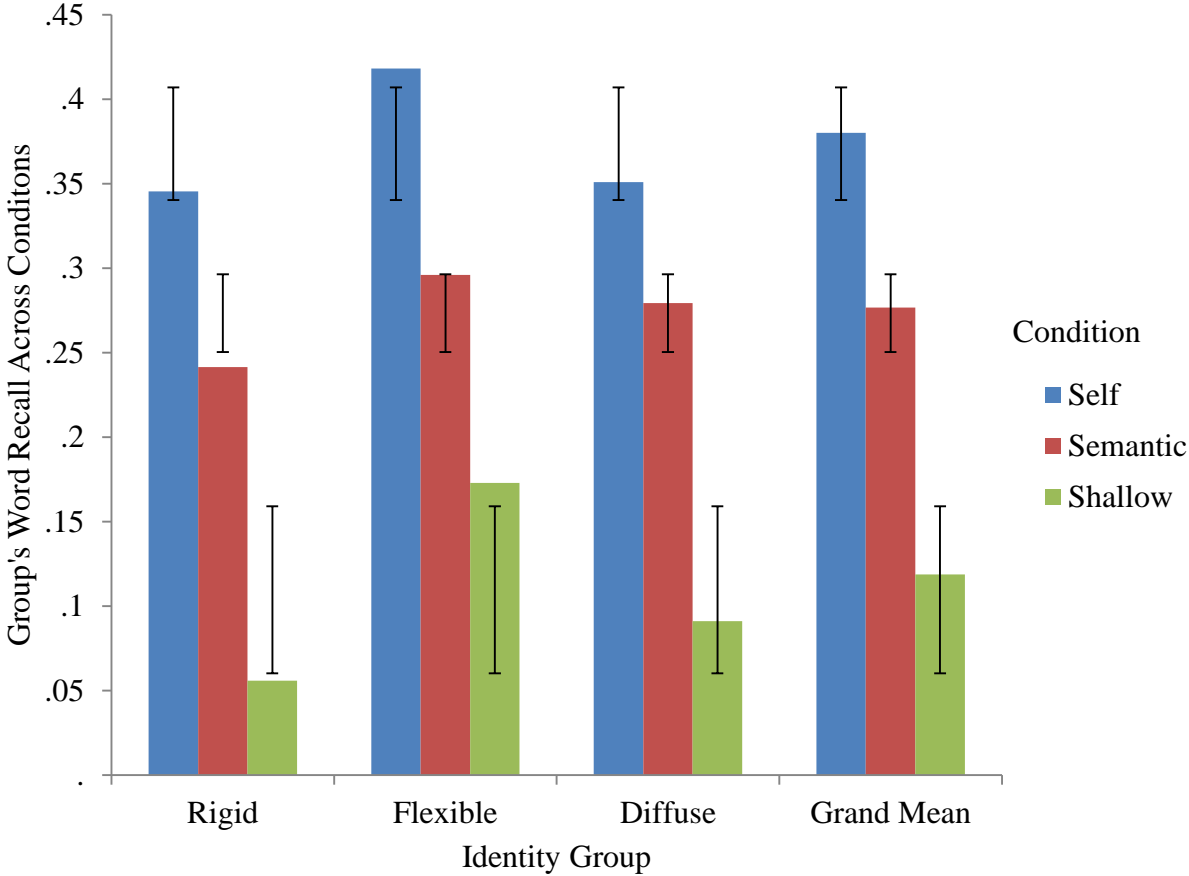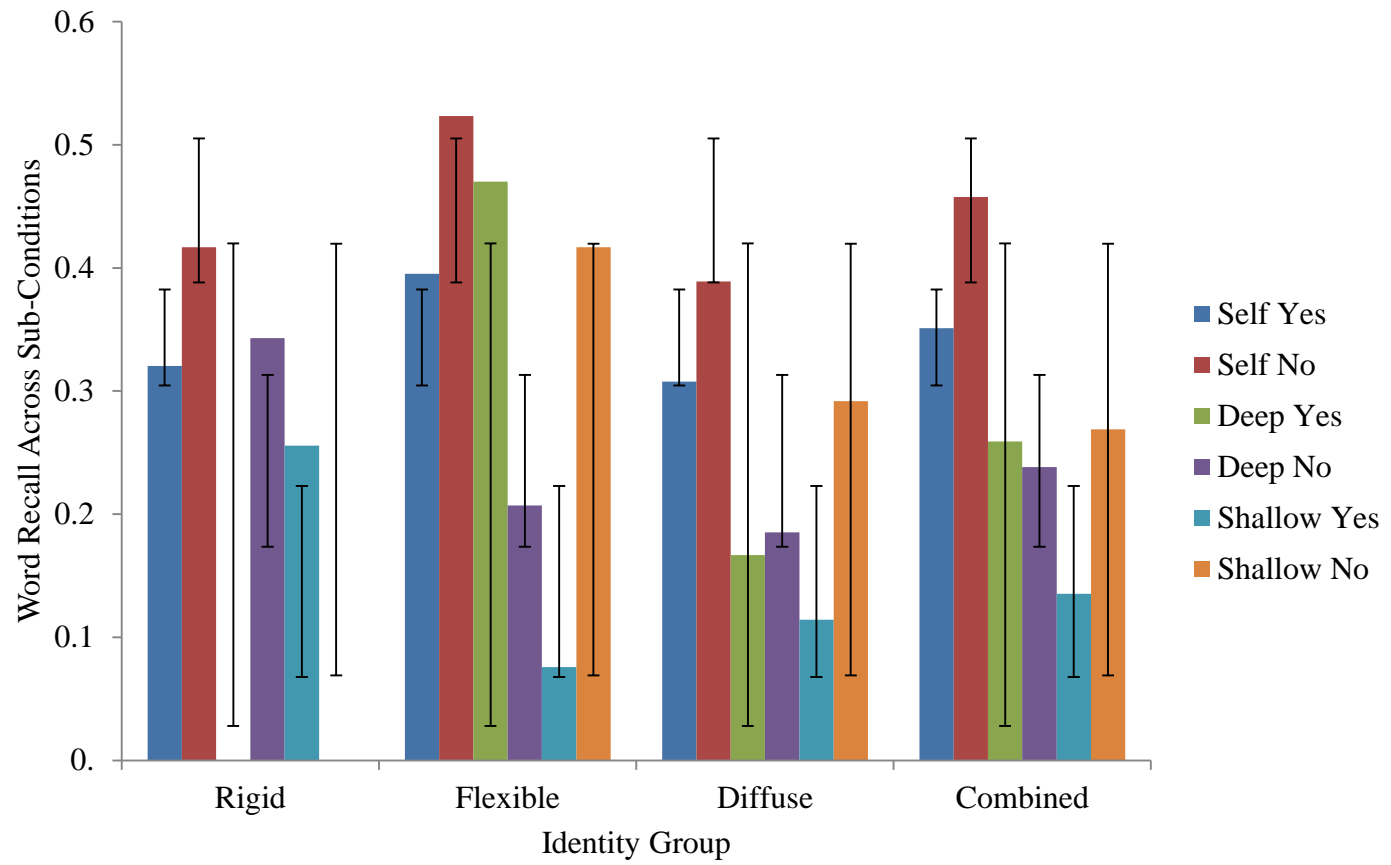
Figure 1

Figure 2

APPENDIX C: OVERVIEW OF THE PROCEDURE EMPLOYED TO GENERATE

A RANDOM DISTRIBUTION OF THE YES AND NO RESPONSES.

The following example is provided for illustration of what each ***participant***

might see.

"Active" is one of the words on the complete list of target words. All participants will see

the word "Active" and each participant will asked a question in relation to the word

"Active." However, ALL participants will only be asked ONE of the following questions:

> a. Does this word appear in all caps? ACTIVE
>
> b. Does Lively mean the same as… Active
>
> c. Does Cerebral mean the same as… Active
>
> d. Does this word describe you? … Active

To make it possible for the DirectRT program to create an equivalent probability across

encoding conditions, DirectRT will contain a larger list than what was just indicated.

The following example is provided for illustration of what ***DirectRT*** will "see" for each

item.

> In the structural condition, a participant could be asked:
>
> > Does this word appear in all caps? ACTIVE
> >
> > Does this word appear in all caps? Active
>
> In the semantic condition, a participant could be asked:
> > Does Lively mean the same as… Active

Does Cerebral mean the same as… Active

In the self-reference condition, a participant could be asked:

Does this word describe you? … Active

Does this word describe you? … Active

More specifically, the rationale for the additional questions is a) to create a prompt intending to elicit a "yes" response and a "no" response within the structural as well as semantic conditions, and b) to create an equal a condition wherein participants have an equal likelihood of getting a self-referent question, two identical self-referent questions are required. Regarding the likelihood of a "yes" or "no" response within the selfreferent condition, as noted above, it is impossible to have experimental control over yes and no responses in the self-referent condition, since the person's view dictates the response. Additionally, while it is possible to create blocks of items designed to elicit yes or no responses, it not feasible to create these blocks; however, scores for the pleasure, valence, arousal, and/or likability, and meaningfulness are presented for the items (see Table 5) and so it will be possible to examine whether these scores statistically predict item endorsement in the self-referent condition or differences in item endorsement based on demographic-diagnostic characteristics (i.e., borderline features).

APPENDIX D: OVERVIEW OF ASSESSMENTS AND PROPOSED GROUP-FORMATION CRITERIA

The overall goal with the use of the following measures is to assess and record: (a) measurable disturbances in identity/self-coherence, from multiple measures, as well as (b) elevations on more generalized measures of personality psychopathology, and (c) where the generalized measures of personality psychopathology offer both categorical and dimensional utility. The need to record (c) both categorical and dimensional measures of generalized personality psychopathology regards the methodological refinement of the behavioral indicator of self-coherence under investigation, where dimensional measures of both (a) identity/self-coherence and (b) generalized personality psychopathology will be utilized in the first stage of developing the indicator. In stage two, categorical measures of functioning will be used to construct discriminant function models, where participants' scores on the proposed indicator will serve as predictors with categorical measures of functioning serving as the outcome.

Categorical Measures of Borderline Symptomatology (i.e., Diagnostic)

PDQ-BOR. Given the PDQ-BOR provides a measure of the *DSM* BPD criteria, endorsement of at least 5 of the 9 items is considered suggestive of being at-risk for the disorder, with fewer than 5 items serving as the location for a diagnostic "cut score." *PAI-BOR.* The BOR scale in isolation has been found to distinguish borderline patients from unscreened controls with an 80% hit rate, and successfully identified 91% of these subjects

as part of a discriminant function (Bell-Pringle et al., 1997).In line with

previous investigations, the current investigation propose a cut-score of 70t for use as part of a discriminant function.

Dimensional Measures of Borderline Symptomatology (i.e., General Personality Functioning)

PDQ-BOR. DSM BPD criteria can aptly be conceptualized as g*eneral indicators of personality pathology* (akin to g in intellectual functioning), an empirical measure of which will be provided by a 0-9 (or 0-14, if fully dimensionalizing the impulsivity item) dimensional "summed" or "symptom count" of the PDQ-BOR, with higher numbers indicating greater levels of *overall* personality dysfunction.

PAI-BOR . The PAI-BOR provides a normed Index of personality functioning, which is operationalized as a dimensional "summed" or "item count" of each of the four subscales of the PAI-BOR, which include Identity , Negative Affect, Negative Relationships, and Self Harm (a measure of impulsivity and disinhibition). Each subscale has 6 items, where each item is measured on a 4-point scale, creating a range of 0-24 for *each* subscale, and thus, an overall index of the full subscales would range from 0-96, with higher numbers indicating greater levels of *overall* personality dysfunction, i.e., poor relationships with self and others, high negative affect, poor behavioral control.

Dimensional Measures of Disturbances in Identity/Self-Coherence

Self-Concept Clarity Scale. The construction of the SCCS was *independent of borderline symptomatology as well as general psychopathology*; moreover, the measure of structural disturbance (identity coherence) provided by the SCCS is considered to be

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theoretically distinct from identity content. The 12-items are rated on 5 point Likert scale ranging from "strongly disagree" to "strongly agree," and as such, total scores may range from 12 to 60, scaled such that scores higher than 30 indicate a dimensional increase in pathological self-concept clarity.

Categorical Measures of Disturbances in Identity/Self-Coherence

SCCS Problematical Identity. Concerns regarding problematical identity on the SCCC will be identified by raw score totals which exceed 36.

SCCS Non-problematical identity. Non-problematical identity on the SCCC will be identified by raw score totals which are below 30.

PAI-BOR-I Problematical identity (*Identity: structural diffusion*) will be grouped based on scores which ***exceed 65t*** (roughly 1.5 standard deviations above community participant means and 1SD above the mean for a community sample aged 18-29 (n=222, M=55.40, SD = 10.99). Individuals from a college-aged sample, with tscores exceeding 65t, can be thought of as having indicators of problematical identity functioning (*i.e., identity diffusion*), at levels which are diagnostically relevant.

PAI-BOR-I Non-problematical identity (*Identity: appropriate structural flexibility*) will be grouped based on scores ranging from 46-65t (within roughly 1 standard deviations of community participant mean scores but *within* 1SD below the mean for a community sample aged 18-29 (n=222, M=55.40, SD = 10.99). Individuals with tscores within the deviation band can be thought of as having identity functioning within normal range (i.e., appropriate identity flexibility).

Exploratory Measures of Identity Functioning

(Exploratory) Problematical identity *(Identity: excessive structural rigidity)*for exploratory purposes, in part because of the nature of identity fluctuation as normative for a college-aged sample, i.e., college is a time where identity concerns are particularly salient and fluctuations on the BOR-I are particularly marked. As such, t scores which are indicative of *below-average fluctuations* in identity begin, conceptually, to move beyond being representative of the *flexibility of normative identity functioning, where flexibility is needed to explore one's world, confront different possible "selves" and "roles" and experience identity crisis—considered essential elements of healthy identity development. Below average fluctuations may be suggestive of rigidity of self-structure, which may alter the use of the self as a tool for memory, and subsequent findings for the SRE.* As such, t scores below 45 will be explored as an additional construct of interest, and intend to characterize identity functioning which, in contrast to the diffuse and disorganized (high) and the normatively flexible (Norm), this group is conceptualized as *rigid*.

Additionally, **PDQ-BOR** captures information regarding identity- specific functioning. Endorsement of *at least one* of the nine items from the PDQ-BPD is considered a marker of ***problematical identity***, namely: Question #32 ("I often wonder who I really am"), where previous correlational factor-analytic work (Calvo et al., 2012) has suggested that #32 relates most strongly to the DSM-IV identity criterion and that together, those two items accounted for 45% (R^2=44.89) of the variance in a factor described as "Relatedness Disorder." Additional results from Calvo et al. (2012) suggest

that Question #69 ("I feel that my life is dull and meaningless") related most strongly to the DSM-IV emptiness criterion, which as a criterion, is itself thought to be a measure of an underlying subjective experience arising from a lack of identity, although notably, previous findings have suggested that the emptiness criteria may not be applicable for men (Benson, Donnellan, & Morey, 2016; Morey & Benson, 2015), and moreover, there is not a sufficient concert of evidence surrounding the use of #69 as a measure of identity, nor sufficient evidence to support the standalone use of these two items as a measure of identity functioning. Therefore, we propose to investigate the standalone use as well as incremental utility of these two items as measures of identity functioning.

Non-problematical identity on the PDQ-BPD will be explored by the lack of endorsement of either question #32 ("I often wonder who I really am") or question 69 ("I feel that my life is dull and meaningless").

SCC-scores at 30 and below will be "summed" scored for their ability to increment indications of overly rigid identity as part of the exploration on Bor-I T scores below 45.

APPENDIX E: PERSONALITY ASSESSMENT INVENTORY BORDERLINE

FEATURES SUBSCALES

PAI Borderline Features Subscales

Affective Instability (BOR-A/6)

    14. My mood can shift quite suddenly.
    54. My mood gets quite intense.
    94. My mood is very steady.
    134. I have little control over my anger.
    174. I've always been a pretty happy person.
    214. I've had times when I was so mad I couldn't do enough to express all my anger.

Identity Problems (BOR-I/6)

    17. My attitude about myself changes a lot.
    57. Sometimes I feel terribly empty inside.
    97. I worry a lot about other people leaving me.
    137. I often wonder what I should do with my life.
    177. I can't handle separation from those close to me verywell.
    217. I don't get bored very easily.

Negative Relationships (BOR-N/6)

    19. My relationships have been stormy. 59. I want to let certain people know how much they've hurt me.
    99. People once close to me have let me down.
    139. I rarely feel very lonely. 179. I've made some real mistakes in the people I've picked as friends. 219. Once someone is my friend, we stay friends.

Self-Harm (BOR-S/6)

    143. I sometimes do things so impulsively that I get into trouble.
    183. When I'm upset, I typically do something to hurt myself.

223. I'm too impulsive for my own good.

263. I spend money too easily.

303. I'm a reckless person. 343. I'm careful
about how I spend my money.

PDQ-IV (borderline subscale)

1. 6. I'll go to extremes to prevent those whom I love from ever leaving me.
2. 19. I either love someone or hate them, with nothing in between.
3. 32. I often wonder who I really am 4. 45. I have tried to hurt or kill myself.
5. 58. I am a very moody person.
6. 69. I feel that my life is dull and meaningless.
7. 78. I have difficulty controlling my anger or temper.
8. 93. When stressed, things happen, like I get paranoid or just "black out."
9. 98 +2 I have done things on impulse that could have gotten me into trouble.
    Check the statements that apply to you

          ___Spend more money than I have

          ___Eating binges

          ___Reckless driving

          ___Having sex with people I hardly know

          ___Drinking too much or

          ___Taking drugs

APPENDIX F: SLIDES SHOWN TO ORIENT PARTICIPANTS TO THE PROCEDURE (DELIVERED VIA THE PROPRIETARY SOFTWARE DIRECT RT)

To warm participants to the procedure, they will be given an overview of the three types of questions they will encounter, in the form of the following series of interactive images.
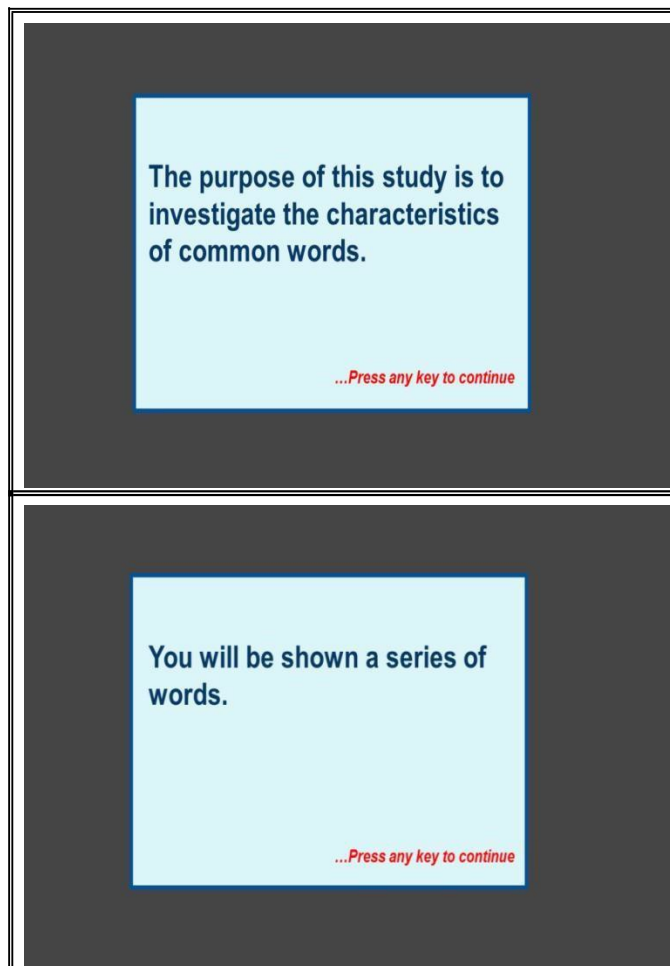
You will be asked three types
of questions about the words
you see.

...Press any key to continue

Each word will appear only
once.

Questions will not be repeated.

...Press any key to continue

You may be asked whether a
word is capitalized.

...Press any key to continue

Is this word in ALL CAPS?

WORD

Press 1 for Yes. Press 2 for No.

**You will have 5 seconds
to respond.**

...Press any key to continue

**You may be asked whether two
words have the same meaning.**

...Press any key to continue

So answer quickly,
but be careful.

...Press any key to continue

Are you ready?

Press 1 for Yes. Press 2 for No.