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Development and Validation of an Implicit Measure of Meta-Motivational States

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The development of an easily-administered, valid and reliable meta-motivational state measure, capable of assessing the full spectrum of states, is needed to further the understanding and application of reversal theory (Apter, 2013). The present paper outlines an adaptation of the Stroop protocol to implicitly measure meta-motivational states and two subsequent validation studies. Consistent with Stroop principles, we hypothesised that state congruent stimuli would capture individuals' attention causing an increased response latency (e.g., Ayres & Sonandre, 2002). Study one (n = 68) assessed the concurrent validity of the Meta-Motivational Stroop task (MMS) against two widely-used explicit measures of state, the Telic/Paratelic State Inventory (T/PSI; O'Connell & Calhoun, 2001) and the State of Mind Indicator for Athletes (SOMIFA; Kerr & Apter, 1999). Contrary to expectations, emotionally incongruent stimuli caused a delayed response, interpreted as an interference effect (Rothermund, 2003). Study two (n = 30) manipulated state, through expressive writing and imagery, to assess the ability of the Stroop task to detect changes in state. Results offered some support for the interference effect, with incongruent stimuli resulting in an increased response latency when writing from a telic perspective. Taken together, results suggest an implicit measure of meta-motivational state has some promise, particularly given the observed limitations of explicit measures.

Keywords: implicit measure, state measure, reversal theory, reversal process

In an attempt to understand why individuals behave differently in similar situations on different occasions, Apter's (1982) reversal theory focuses on the role of one's meta-motivational state. Aligned with ideographic and state-focused approaches to personality, Apter (2003) suggests that a person may perceive situations, emotions, and cognitions differently depending on which of four pairs of mutually exclusive meta motivational states they are in (telic-paratelic, mastery-sympathy, conformist-negativistic, alloic-autic). Each state is characterised by a distinctive way of interpreting aspects of one's motivation (e.g., serious when in a telic state vs. playful when in a paratelic state, or, compliant when in a conformist state vs. rebellious when in a negativistic state). Crucially, reversal theory maintains that it is important for individuals to reverse between states on a regular and frequent basis to be considered psychologically healthy; individuals who have difficulty reversing or who have low lability (inhibited reversals) may suffer from rigid behaviour patterns and experience poor psychological health (Apter, 2001). Thus, an understanding of how, when, and why people reverse is a key element of the development of interventions aimed at assessing lack of lability and monitoring or preventing inappropriate reversals.

Concerns regarding limited exploration in the literature of such a fundamental aspect of reversal theory have been recently raised by the theory's founder (cf. Apter, 2013). To date research examining the reversal process has been limited and has taken the form of retrospective measures (e.g., Bellew & Thatcher, 2002) or qualitative assessments of state (e.g., Hudson & Walker, 2002). The lack of research regarding the reversal process may be attributable to the difficulty of measuring an individuals' meta-motivational state. Although a number of measurement tools exist, these are problematic for several reasons. First, the Telic State Measure (TSM; Svebak & Murgatroyd, 1985) and the Telic/Paratelic State Instrument (T/PSI; O'Connell & Calhoun, 2001) only assess the telic/paratelic pair; highlighting a bias in rever-

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sal theory research towards these states. Second, although an alternative tool, the State of Mind Indicator for Athletes (SOMIFA; Kerr & Apter, 1999), does measure all four state pairs, it lacks content validity, using single items to assess multi-dimensional constructs. Further, its use may be context specific given the nature of its development (competitive sport). More importantly, we argue that a common problem with these measures is their explicit nature, leaving them susceptible to a number of criticisms as explicated below.

Explicit measures typically reference a target object in the participant's personal history (Jacoby, Lindsay, & Toth, 1992) and thus assume that the participant has already formed an opinion or is able to construct one in situ (Schwarz & Bohner, 2001), is aware of/has access to his/her attitude (Fazio, 1986), and is willing to share it accurately with the researcher (e.g., LaPiere, 1934). Consequently, explicit measures can be unreliable when respondents are either unwilling or unable to report accurately (Greenwald et al., 2002). The former is a problem for any measure requiring explicit reporting of behaviours, attitudes, or emotions attached to pro or anti-social values. For example, in terms of reversal theory, individuals may not honestly report motivations or moods typically seen as socially undesirable (e.g., feeling rebellious whilst in the negativistic state or feeling selfish whilst in an autic state). The second influencing factor, accuracy, is of particular importance when attempting to measure meta-motivational state, as it requires individuals to have an awareness of their current state in order to accurately self report. In line with reversal theory, respondents may not be consciously aware of their current state; states become observable in conscious experience once ones attention has been suitably drawn to them, however this requires the individual to have some awareness of the terminology and conceptualisation of meta-motivational states (Apter, 1982). Thus, individuals may struggle to relate their current feelings to the theoretically-derived terms of reference used (e.g., a parent may not associate needing time away from the family environment with an autic-sympathy state).

In contrast, implicit actions or judgments are under the control of automatically activated evaluation, without the performer's awareness of that causation (Greenwald & Banaji, 1995). Thus, implicit measures do not require the participant to be aware of their current meta-motivational state, or accurately and honestly share this with the researcher, and so may be a more suitable measure of current meta-motivational state than explicit measures. However, evidence concerning the influence of affective motivational states on the automatic processing of affectively congruent and incongruent valence using implicit measures is equivocal at present (Rothermund, 2003).

One approach (e.g., Kunde & Mauer, 2008) posits that greater cognitive effort is required to process incongruent stimuli; thus, attending to words of opposite valence to the current motivational state would exert greater disruption and interference, increasing response latency. The theorized 'confusion' or enhanced processing that results from an incongruent stimulus is somewhat consistent with paradigms advocating that threatening stimuli affect attentional disengagement, effectively 'capturing' an individual's attention for longer before they can attend to a secondary stimulus (e.g., Fox, Russo, Bowles, & Dutton, 2001). If an incongruent stimulus functions as a threat to the status quo, one might expect longer response latencies for these than contingent stimuli.

Conversely, a second approach posits that emotionally congruent stimuli momentarily "grab" or capture participants' attention, slowing response latencies. These findings have been widely demonstrated using a Stroop (color recognition) task in areas including public speaking apprehension (e.g., Ayres & Sonandre, 2002), phobias (e.g., Matthews & Sebastian, 1993), and mental health (e.g., Williams, Watts, & MacLeod, 1996). Adopting an emotion-focused approach would lead to the assumption that congruent stimuli would have increased emotional significance and response latencies relative to incongruent stimuli. Given reversal theory's focus on the emotional outcomes of different states and the rationale for implicit techniques partly relating to reducing the need for conscious processing, we proposed that meta-motivational states would function in a similar way to mood/emotional states and that confusion (which requires comparison and hence higher level cognitive processing) was less likely than the more subtle interference presented by emotional resonance with the stimulus.

Drawing from this previous literature highlighting the use of implicit measures for indicating emotional states, we suggest that an adapted Stroop protocol, using non-color words, may be a useful measure of an individual's meta-motivational state. The structural phenomenological nature of reversal theory allows systemic interpretation of experiences through the mutually exclusive nature of meta-motivational states and so only one state from each pair can be operative at any time, but the operative state can change over time. Consistent with previous emotional Stroop research and the interference effect described earlier, it is posited that words associated with the individual's current meta-motivational state (e.g., "fun" whilst in a paratelic state) have greater emotional significance and relevance to the individual's current concerns (Williams, Matthews, & MacLeod, 1996) than words relating to the opposing state at that instance. Hence, we hypothesized that individuals would present a greater response latency for state-congruent than state-incongruent stimuli.

Although not the focus of the present research, testing responses to meta-motivational-related stimuli using a Stroop paradigm also enables an exploration of the ways in which individuals' cognitive processing operates in different states. For example, whilst in a telic state an individual may success-

Table 1
Final pool of 8 items per meta-motivational state

Telic	Paratelic	Conformist	Negativistic	Sympathy	Mastery	Alloic	Autic
Goal	Risks	Conform	Defiant	Affection	Competition	Altruistic	Individual
Serious	Thrills	Obedient	Stubborn	Love	Power	Altruism	Egotistic
Future	Playful	Compliant	Rebellious	Sympathetic	Resilience	Supporting	Independence
Accomplishment	Spontaneous	Respectful	Innovative	Tenderness	Supremacy	Collective	Individuality
Purpose	Present	Rules	Rebel	Caring	Control	Selfless	Myself
Meaning	Carefree	Cooperation	Provocative	Harmony	Contest	Empathy	Selfish
Cautious	Immediate	Norms	Angry	Kindness	Dominance	Give	Self
Calm	Humor	Agreeable	Contradict	Sensitivity	Aggressive	Unity	Ego

fully orientate towards congruent stimuli, effectively blocking those that might distract from the current task. Conversely, whilst in a negativistic state incongruent stimuli may attract and excite the individual. Further, processing efficiency might alter depending upon one's meta-motivational state, with some more conducive to attentional focus than others. These ideas move beyond the initial exploration presented by this study, however, the emergent questions highlight the broader utility of a Stroop-based measure of cognitive responses within the field of reversal theory.

In sum, the purpose of the present research was to develop and validate an implicit measure of meta-motivational states using an adapted Stroop protocol. Study one presents Meta-Motivational Stroop (MMS) development, tests of internal robustness, and assessments of its convergent validity with explicit measures of state, the T/PSI and the SOMIFA. It was expected that all three measures would demonstrate convergence in identifying active states, however, the explicit measures were anticipated to have greater alignment with each other than with the MMS. Study two manipulated state, through expressive writing and imagery, to assess the ability of the Stroop task to detect changes in state.

Study 1 Method

MMS Development

The development of the MMS initially required the primary researchers (including an author with several reversal theory publications and expertise in measurement development) to generate a word pool for each state. Selected stimuli included characteristics and positive aspects related to being within a particular state that were drawn from a review of reversal theory literature. Words relating to the negative connotations of not achieving motivational goals whilst within that state (e.g., 'bored' whilst in a paratelic state) were excluded as it was posited that they may fail to grab the participant's attention to the same extent as the characteristics and positive connotations associated with being in a state. This initial phase resulted in a total of 160 stimuli, ranging from 14 to 28 words per meta-motivational state.

Once the initial word pool had been generated, five reversal theory experts (members of the reversal theory society and authors of numerous reversal theory publications) rated each item on a Likert scale from 1 (very poor match) to 5 (excellent match) in relation to how appropriate each item was for its intended meta-motivational state. An average score for each item was calculated; items with an average below 3.5 (adequate or below) were removed from the pool resulting in the removal of 45 items. Items that included hyphenated words or short phrases (e.g., 'risk-taking' and 'easy going') were removed as reviewer feedback highlighted that they may affect response latency due to blank spaces reducing lateral masking of the beginning and end letters of words, thus making them easier to see (Bouma, 1973). Similarly, items using a negative prefix (e.g., 'unconventional') were removed, as they may be more difficult to process, thus increasing color-naming latency (Hutchison & Bosco, 2007). This resulted in a further 12 items being removed from the word pool. There was extended discussion with the expert reviewers regarding the inclusion of negatively-focused stimuli; although this limited the word pool conceptually, removing negative words in the development phase reduced the possibility of cross-loading onto oppositional state pairs and as work was grounded in the framework provided by emotional state/mood-based research, for the first iteration it was concluded that only positive stimuli should be included (similar to that work). Future iterations of the measure may seek to test whether positive and negative stimuli adhere to the RT structure. Following the feedback process, the remaining 103 items were then matched, by word length and linguistic complexity, across the meta-motivational state pairs, resulting in a final pool of 8 items per meta-motivational state (see Table 1).

MMS Validation

Participants. An opportunistic sample of 68 participants (mean age = 29.87 years, SD = 12.30; n = 39 males, 29 females) volunteered to take part in the study. Participants were all fluent in written and spoken English, which was the first language for 64 of the participants.

Measures.

Meta-motivational Stroop Task. Participants received standardized instructions informing them of the task, which took approximately 45 seconds to read. Participants then responded to 160 stimuli, consistent in length with previously administered Stroop tasks (e.g., McKenna & Sharam, 2004). Thus, the MMS consisted of 20 stimuli per meta-motivational state, separated by a pretrial period lasting 200 ms. It was determined through pilot testing that participants took approximately 140 seconds to complete the task. During the task the 8 items for each meta-motivational state were randomly presented in Arial font, at 1 cm in height (font size 22), against a white background. The font color in which the words were presented was randomly set to one of the following: red, green, blue or black. Participants were instructed to indicate the color of the word, as quickly as possible, whilst making as few errors as possible, by pressing an assigned keyboard key for the specific color. An incorrect response resulted in a red 'X' flashing on the screen and a pause of 400 ms prior to the next stimulus. Average response times for each meta-motivational state were produced; state pair ratios were also calculated (e.g., Mean telic latency / Mean paratelic latency; ratio > 1 indicates a telic state whilst a ratio < 1 indicates a paratelic state).

State of Mind Indicator for Athletes (SOMIFA; Kerr & Apter, 1999). The SOMIFA identifies active meta-motivational states from the four mutually exclusive state pairs in a sporting context. Items 1-4 consist of pairs of statements, each reflecting one meta-motivational state, for example, "achieve something important to me" to depict a telic state, or, "simply enjoy the fun of participating" to indicate a paratelic state. For the purpose of the present study the stem for items 1 to 4 was modified to be pertinent to the experimental situation as opposed to performing in a sporting context. For example, "be tough and dominating during my performance" was modified to read "to feel superior and confident during the task". Participants were required to choose the statement that best corresponded with their motivation during the task.

Telic/Paratelic State Inventory (T/PSI; O'Connell & Calhoun, 2001). The T/PSI is a 12-item measure of current meta-motivational state consisting of seven serious/playful items and five arousal avoiding/arousal seeking items. The T/PSI was used instead of the the TSM due to low intercorrelations between the four items of the TSM (Cook, Gerkovich, Potocky, & O'Connell, 1993). For the purpose of this study the T/PSI stem was amended for parity with the SOMIFA to relate to how the participant felt while completing the task as opposed to how they were feeling in the last few minutes. Each item consists of pairs of opposite meta-motivational states, located either side of a 6 point rating scale (e.g., ranging from "feeling playful to feeling serious minded"). Participants were required to select the number which best described how they felt during the task, with low scores representing a telic state whilst a high score represents a paratelic state. The T/PSI has excellent internal consistency (Cronbach's alpha = .89) for the inventory as a whole however during the measure's development its component sub-scales demonstrated weaker reliability. Its authors have concluded that due to the high correlation between the factors (.58), the inventory is acceptable for use in its entirety (O'Connell & Calhoun, 2001).

Procedure. On arrival at the laboratory, participants were required to read the participant information sheet and had the opportunity to ask the principal researcher questions regarding the study. If willing, participants completed a questionnaire pack consisting of a consent form and demographic information. Participants then read the standardized Stroop instructions and began the task when ready. On completion of the MMS, participants completed the explicit measures before being thanked and debriefed.

Study 1 Results

Initial Data Screening

Univariate outliers from the Stroop latency were identified using casewise diagnostics, highlighting cases two standard deviations from the residual mean. Nine cases were identified as outliers: two participants appeared as outliers on multiple sub-scales (six and seven, respectively), demonstrating consistently long response latencies (greater than 1200 ms) which may be considered as approximating explicit responses (Dasgupta, McGhee, Greenwald, & Mahzarin, 2000; Mendoza, Gollwitzer, & Amodio, 2010; Nier, 2005). These participants were removed from further analysis. A further four outliers with response latencies greater than 1200 ms were removed from analysis concerning the problematic meta-motivational states (Mastery, Negativistic, Alloic and Autic). Data screening revealed acceptable levels of skewness and kurtosis for all sub-scales on removal of the six outliers.

MMS Descriptive Statistics

Data screening of the MMS revealed that each word stimulus was shown on average 163.77 (SD = 8.97) times throughout the study with an average response latency of 750.23 milliseconds (SD = 330.14). There were no significant differences in response latency between meta-motivational states, $F(7, 10473) = 1.031$, $p = .407$, or between response latency to stimuli within meta-motivational states, with the exception of the paratelic sub-scale: $F(7, 143) = 2.14$, $p = .05$, in which participants responded significantly quicker, $p = .015$, to the stimuli "Present" ($M = 688.25$) than "Playful" ($M = 790.91$). This was not felt to be overly potentiate; given the number of differences tested, the emergence of so few significant differences was considered

Table 2
Number of participants and mean response latencies of active (longest response latency) and non-active states (smallest response latency)

Active state	*n*	*M* (SD)	Non active state	*M* (SD)	*p*
Within State Pair					
Telic	36	814.52 (129.11)	Paratelic	742.01 (113.69)	.000
Paratelic	30	738.70 (114.18)	Telic	680.10 (100.13)	.000
Mastery	32	764.93 (131.72)	Sympathy	711.69 (121.75)	.000
Sympathy	33	817.42 (135.56)	Mastery	729.54 (109.97)	.000
Conformist	32	769.90 (114.15)	Negativistic	706.32 (98.65)	.000
Negativistic	33	780.62 (146.32)	Conformist	720.72 (124.22)	.000
Alloic	38	782.32 (122.30)	Autic	725.79 (112.18)	.000
Autic	26	736.95 (87.36)	Alloic	695.71 (87.49)	.000
Out of State Pair					
Telic	36	814.52 (129.11)	Conformist	766.37 (118.21)	.038
Sympathy	33	817.47 (135.56)	Paratelic	753.39 (108.19)	.009
Sympathy	33	817.47 (135.56)	Alloic	757.01 (115.35)	.030
Sympathy	33	817.47 (135.56)	Autic	732.56 (104.81)	.000

an excellent outcome. These data were therefore taken to assume equality of lexical complexity and processing time for each stimulus, as required to ensure standardization between test stimuli.

Participants' data from the MMS were coded, for each meta-motivational state pair, for the active state (longest response latency) and the non-active state (smallest response latency). Eight one-way repeated measures ANOVAs were conducted; all revealed significant differences between response latencies of the meta-motivational states (a Greenhouse-Geisser correction factor was used due to violation of sphericity assumptions). Bonferonni follow up tests revealed significant differences between response latency of meta-motivational state pairs (within state pair), supporting the mutually exclusive nature of reversal theory; significant differences emerged for out of state pairs for four paired states (see Table 2).

Questionnaire Reliability

Examination of the Cronbach's alpha levels of the T/PSI revealed acceptable reliability for the three sub-scales of the T/PSI (.600 to .781). The avoiding/arousal seeking sub-scale revealed a Cronbach's alpha of .600, increasing to .740 with the removal of item 7 "concerned about the future effects of my current activity/not concerned about the future effects of my current activity". The inter-item correlations showed that item 7 was negatively correlated with items 9 and 12 (r = -.091 and -.119, respectively) and weakly correlated to items 2 and 5 (r = .050 and .164, respectively). Inspection of the content of item 7 indicated greater connection to the serious/playful sub-scale as opposed to the arousal avoiding/arousal seeking sub-scale. This was supported by the Cronbach's alpha of the serious/playful sub-scale increasing to .796 with the addition of item 7.

Due to the low inter item reliability of the AA/AS subscale and the structure differences discussed by O'Connell and Calhoun (2001), factor analysis was conducted to examine the structure of the T/PSI; the extraction method used was principal axis factoring with oblique rotations. The KMO = .671 and all KMO values for individual items were above the acceptable limit of .5 (Field, 2009, p. 659). Bartlett's test of sphericity, $\chi^2(66) = 277.051$, $p < .001$, indicated that correlations between items were sufficiently large for factor analysis. The determinant value was greater than .001, suggesting no multicollinerarity (Field, 2009, p. 657). An initial analysis was computed to obtain eigenvalues for each component of the data. Three components had an eigenvalue meeting the Kaiser criterion of 1 and in combination explained 61.47% of the variance, this was supported by the scree plot showing inflexion at component 3; thus three components were retained in the final analysis.

Table 3 shows the factor loadings after rotation. The items that cluster on the same components suggest that component 1 represented a sub-scale concerned with being in the moment (paratelic) or with the future effects of the activity (telic) consisting of items 7, 4, and 10. A second component of AA/AS consisting of items 9, 2, 5, 12, 11; finally component 3 shows a sub-scale of items relating to SM/P (items 3, 8 and 1). The three sub scale structure of spontaneity, SM/P and AA/AS is unsurprising given the characteristics of the telic-paratelic state pair discussed within the literature and measures including the telic and paratelic dominance measures (Murgatroyd, Rushton, Apter, & Ray, 1978; Cook & Gerovich, 1993) and the telic state measure (Svebak & Murgatroyd, 1985). Item 6 appears to be cross loading with the adventure/arousal dimension and future/in the moment scale, however the correlation is weak (r = .306 and .331, respectively). Cronbach's alpha revealed that the three sub-scale

Table 3
Summary of exploratory factor analysis results for the T/PSI

Item No.	Item	Subsection	Factor 1	Factor 2	Factor 3
7	Concerned about the future effects of my current activity / Not concerned about the future effects of my current activity	AA/AS	**.766**	-.091	.050
4	Doing the activity just for the fun of it / Doing the activity because it may affect my future	SM/P	**.715**	-.097	-.122
10	Living for the moment / Focusing on the future	SM/P	**.562**	.110	.039
9	Wanting to feel less aroused / Wanting to feel more aroused	AA/AS	-.130	**.751**	.222
2	Wanting peace and quiet / Wanting adventure	AA/AS	.083	**.739**	.023
5	Wanting to feel excitement / Wanting to feel calm	AA/AS	.241	**.552**	-.083
12	Feeling adventures / Not feeling adventurous	AA/AS	-.194	**.544**	-.266
11	Feeling serious / Feeling playful	SM/P	.280	**.476**	-.349
6	Wanting to be serious / Wanting to be playful	SM/P	.306	.331	-.214
8	Wanting to just have fun / Wanting to accomplish something	SM/P	.118	-.179	**-.890**
3	Trying to accomplish something / Just having fun	SM/P	-.069	.047	**-.622**
1	Feeling playful / Feeling serious-minded	SM/P	.264	.263	-.340
	Eigenvalues		4.06	2.06	1.25
	% of variance		33.84	17.18	10.45

Note. AA/AS = Arousal Avoidance/Arousal Seeking, SM/P = Serious Minded/Playful. Factor loadings over .40 are in bold.

inventory appeared reliable, with alphas of .777 for the adventure/arousal dimension, .715 for the future scale and .750 for the fun/serious dimension. Taken together, the analysis of the reliability and structure of the T/PSI would suggest that further validation of the T/PSI is required. The results obtained in this study do not support the two dimensions of AA/AS and SM/P.

Correlational Analyses

To assess convergent validity, bivariate correlational analysis was performed between Stroop latency ratio (telic/paratelic) and the T/PSI. Results revealed a small positive correlation approaching significance ($r = .239$; $p = .053$). The positive correlation indicated that state congruent stimuli exert *less* interference than state incongruent stimuli.

Frequency Analysis

A frequency comparison between states identified by the MMS, T/PSI and SOMIFA assessed the number of cases in which the three measures were in agreement regarding participants' current meta-motivational state. Current state was shown through an increased response latency to state congruent stimuli when using the MMS and using the suggested scoring criteria for the T/PSI (< 41 indicating a telic state and > 40 indicating a paratelic state; O'Connell & Calhoun, 2001). The MMS matched meta-motivational state with the T/PSI on 39.40% of participants (47.50% telic and 34.62% paratelic), and 50.58% of participants across the full spectrum of meta-motivational states assessed through the SOMIFA. The two existing measures, the T/PSI and SOMIFA were in agreement on current meta-motivational state for 59% of participants.

Study 1 Discussion

The aim of study one was to develop and provide some initial validation for an adapted Stroop protocol as an implicit measure of meta-motivational state. When assessing concurrent validity of the MMS against the previously validated T/PSI, results demonstrated a small to moderate correlation, however this was in the opposite direction than originally theorized. That is, a decreased response latency to state-congruent stimuli relative to non-state congruent stimuli was observed. This suggests that state congruent stimuli exert less interference than state incongruent ones. Although contrary to original expectations and emotionally focused Stroop tasks, these emergent findings are consistent with recent work by Kunde and Mauer (2008) who posited that greater cognitive effort is required to process incongruent valence stimuli, similar to the original Stroop effect, thus resulting in greater response latency (Botvinick, Braver, Barch, Carter, & Cohen, 2001; Kunde & Wuhr, 2006; Stroop, 1935). Allocating attentional resources to mood incongruent information might be functional for the regulation of emotion and action which is important for mood repair (Taylor, 1991), and, crucially in an RT context, for flexible switching of attention between opportunities for enhancing well-being to allow the individual to allocate sufficient attention to new goals (Rothermund, 2003).

Some general support for incongruent attention capture in relation to motivational state is presented by Rothermund (2003), who investigated the relationship between outcome-

related motivational states and processes of automatic attention allocation in a series of four experiments. Of particular relevance, the final study examined the automatic processing of word valence in a grammatical categorization task, demonstrating stronger interference effects for target words whose valence was opposite to the current motivational state. It was theorized that attending to the valence of incongruent valency words exerted a non-specific distraction, or "interrupt" effect, with Rothermund suggesting that attention is automatically allocated to the valence of an affectively incongruent stimulus. Additionally, Rothermund's work identified that the incongruent effect only occurred in valence shift trials that required an attentional shift from preceding target words to the subsequent trial word as the two words differed in valence. These shifts mirror the presentation of the MMS; due to the randomization of trials and eight meta-motivational states being measured, it is highly unlikely that stimuli from the same state would be presented sequentially.

The emergent finding for incongruent meta-motivational stimuli to capture attention might also be explained by the nature of reversal theory itself, in that people should be motivationally versatile (Dixon, 1994) and open to change and reversals to other states in order to maintain psychological health and display a range of moods and behaviours (Apter, 1982; Apter & Carter, 2002). The pursuit of desired or alternative behaviours and moods, through the reversal process, may result in an increased response latency to stimuli associated with alternative states, as greater cognitive effort is required to process and evaluate the alternative behaviours, moods and environment. Thus, we have learnt to usefully allocate attention capture to contingent stimuli or events that might relate to states that differ from our present one. This suggestion of innate or learnt tendencies to orientate towards triggers of reversals warrants further investigation.

Due to the exploratory nature of assessing current meta-motivational state using an implicit measure and the unpredicted relationship between the MMS and the T/PSI, further validation of the MMS was essential. As such, study two aimed to manipulate meta-motivational state through inducing a reversal to the required state using two forms of contingent events: expressive writing and imagery (Desselles & Apter, 2013). Priming participants to experience a desired meta-motivational state allows the researchers to manipulate participants' current meta-motivational state rather than relying on the T/PSI as a point of comparison. Writing tasks have been used successfully to prime emotions in previous studies, for example, Pavey, Greitemeyer, and Sparks (2011) primed participants into a relatedness state, whilst Hudson and Day (2012) used an expressive writing task to enable participants to recreate and switch between the different meta-motivational states.

Thus, study two used Hudson and Day's (2012) protocol to prime participants to experience a desired meta-motivational state. Study two isolated the telic-paratelic state pair to conduct a rigorous assessment of the MMS validity whilst limiting interference from the other three state pairs. It was hypothesised, in line with study 1 findings, that stimuli associated with participants' primed meta-motivational state would be associated with a reduced response latency whilst stimuli associated with the non-primed state would be associated with increased response latency. It was expected that when writing from the serious perspective participants' response latency to paratelic stimuli would be greater than that to telic stimuli. In contrast when writing from a playful perspective participants' response latency to telic words would be greater than when responding to paratelic stimuli. To compare the sensitivity of the MMS with an explicit measure, the T/PSI was also administered.

Study 2 Method

Participants

A second opportunistic sample of 35 participants (mean age = 34.09 years, SD = 14.67; n = 15 males, 20 females) was recruited to take part in the study. Participants were all fluent in written and spoken English; which was the first language for 34 of the participants. All participants gave written informed consent to take part and completed the same measures used in study one.

Procedure

The procedure followed Hudson and Day's (2012) protocol, in which participants attended three separate sessions. Prior to attending the laboratory, participants were provided with an information sheet explaining the details of involvement in the study and the content of the three sessions. Session 1 (approximately 45 minutes) required participants to complete a consent form and demographic information, followed by a 20-minute writing task about a recent stressful event. Participants then read a reversal theory information sheet and completed two short tasks to demonstrate their understanding of the theory. In session 2 (approximately 30 minutes), participants were read a guided imagery script designed to aid understanding of the telic and paratelic meta-motivational states. The imagery script contained both stimulus and response propositions (cf. Cumming, Olphin, & Law, 2007) and took on average 7 minutes to complete. The imagery script initially aimed to relax participants, prior to a "guided" tour of a corridor containing a telic and paratelic door. Participants were asked to furnish each room with appropriate items; anything that they considered to be serious, achievement focused and looking to the future when in the telic room, and fun, playful and focused on the present when in the paratelic room. After furnishing each room participants were given the opportunity to make a few notes about what they had imaged to aid their recall in the final session.

Finally, in Session 3 (approximately 60 minutes), participants completed two 10 minute writing tasks about the event chosen in session one; once from a telic and once from a paratelic perspective. The order of writing perspective was randomized between participants. Prior to completing the writing task, participants re-imaged the appropriate meta-motivational state room created in session two. After writing from the required perspective, participants completed the MMS followed by the T/PSI.

Study 2 Results

Initial Data Screening

As previously recommended, responses that were deemed too fast (< 300 ms) or too slow (> 1200 ms) were removed in order to clear the data set of accidental and explicit responses (Dasgupta et al., 2000; Mendoza et al., 2010; Nier, 2005). Three outliers in the MMS data demonstrated consistently long response latencies (> 1200 ms), which may be considered verging on explicit responses. These participants were removed from further analysis.

Manipulation Check - Content Analysis of Writing

The written narratives of participants were examined by two researchers using content analysis to ensure they complied with the requirements of each condition. Results revealed that all participants successfully wrote from the telic perspective; writing focused on the serious aspects of their chosen event, goals of how they wished to improve or what they had hoped to achieve, focused on the future while giving purpose to the present. However, the narratives from the paratelic condition revealed that many participants had difficulty writing regarding their event from this perspective. Participants were on occasion not able to enjoy risks, be playful, or focus on the present. For this reason any participants who had not successfully written from a paratelic perspective were removed from the data set, resulting in the exclusion of 12 participants and a final sample of 20.

To examine if the excluded participants reported a difference in their active salient state between conditions paired samples t-tests were performed on their T/PSI data. Results revealed a significant difference between participants' T/PSI scores from the serious (telic; M = 29.91, SD = 6.02) and the playful (paratelic) conditions (M = 45.55, SD = 6.23; $t(10)$ = -7.174, p < .001), that is, those who were excluded for protocol violations nevertheless were significantly more telic in the telic condition than the paratelic condition.

MMS Descriptive Statistics

Telic Writing Condition. Data screening of the MMS revealed an average response latency of 630.38 ms (SD = 171.92). Repeated measures ANOVAs revealed nonsignificant differences in response latency to stimuli between meta-motivational states, $\chi^2(7) = 3.76, p = .807$, and between response latencies to stimuli within meta- motivational states (p = .288 to .856).

Paratelic Writing Condition. Data screening revealed an average response latency stimuli of 670.01 ms (SD = 294.95). Repeated measures ANOVAs revealed nonsignificant differences in response latencies to stimuli between meta-motivational states, $\chi^2(7) = 1.78$, p = .971, and between response latencies to stimuli within meta-motivational state (p = .067 to .973) with the exception of the paratelic state in which participants' response latency was significantly greater to the stimulus 'risks' (M = 677.64, SD = 194.87) than 'spontaneous' (M = 571.71, SD = 194.87; p = .002). As in study one this was not considered to be potentiate given the number of differences tested, and provided further support for the suitability of the selected MMS stimuli.

Changes in State across Writing Conditions

To examine if participants' active state differed between the telic and paratelic conditions, paired samples t-tests were performed. Results revealed a nonsignificant difference in the telic to paratelic MMS ratio between the telic writing condition (M = .993, SD = .065) and paratelic writing condition (M = .923, SD = .217; $t(19)$ = 1.481, p = .155). In contrast, a significant difference was observed in the telic to paratelic T/PSI score between the serious writing condition (M = 30.85, SD = 8.24) and the playful writing condition (M = 47.80, SD = 12.84; $t(19)$ = -4.528, p < .001).

Correlation Analysis

Bivariate correlation analyses revealed that in both the telic and paratelic condition, the MMS and the T/PSI were positively related; neither association was significant (r = .348, p = .132, r = .051, p = .832, respectively).

Frequency Analysis

Frequency comparison between the MMS and the T/PSI assessed the number of cases in which the measures were in agreement regarding participants' current mea-motivational state. As in study one, current state was shown through the MMS by an increased response latency to state incongruent stimuli, whilst the suggested scoring criteria was used for the T/PSI (< 41 indicating a telic state and > 40 indicating a paratelic state; O'Connell & Calhoun, 2001). The two measures were in agreement for 59.09% (64.71% telic and 40.00% paratelic) of participants in the telic condition and 52.17% (33.33% telic and 64.29% paratelic) in the paratelic condition.

Discussion

The results offered no support for the hypothesised differences in response latency between primed conditions, suggesting that the MMS was unable to detect changes in primed states. In contrast the explicit measure detected the expected state changes; participants were identified as significantly more telic, when writing from a telic perspective, and more paratelic when writing from a paratelic perspective, using the T/PSI. However, this difference in meta-motivational state across writing conditions should be interpreted with caution. Importantly the expected change in active state was also apparent in excluded participants who did not adhere to the priming manipulation. It is plausible, therefore, that participants responded to the T/PSI in line with what they believed the researcher wanted to see (LaPiere, 1934); participants were aware that the researcher wanted them to feel more serious, goal orientated and focused when writing in the telic condition, and more playful, spontaneous and carefree when in the paratelic condition, and so responded accordingly on the explicit measure. There is no other reason why significant differences in state on the T/PSI should have emerged in the non-primed (non-compliant) group.

The findings from study two partly replicate those of study one revealing a moderate positive correlation between response latency and the T/PSI when writing from the telic perspective. However, no relationship was evident when writing from the paratelic perspective. Responses on the MMS demonstrated a trend for an increased response latency to paratelic compared with telic stimuli regardless of writing condition. The authors tentatively propose that this demonstrates a difference in the processing of stimuli dependent on meta-motivational state; when in a telic state attention is captured by state incongruent stimuli, illustrating an openness to reverse to an alternative states to aid achievement of future goals. In contrast, when in a paratelic state individuals are focused on the present and so attention is captured by state congruent stimuli. The suggestion that meta-motivational states may use different cognitive processes is a novel proposition and one that requires additional examination.

General Conclusions

The adapted Stroop task, successfully used in previous research assessing motivation and emotion (Ayres & Sonandre, 2002; Williams et al., 1996), revealed a pattern of results in which state-incongruent stimuli exerted an interrupt effect and extended response latency relative to state-congruent stimuli. This is similar to both the original Stroop effect and subsequent research regarding emotions (Kunde & Mauer, 2008; Stroop, 1935). Convergence between the measures was as expected; associations between the MMS and the two current explicit measures of state was weaker than between the two explicit measures. However, convergence between the two explicit measures was weaker than expected given the similarity in measurement type. Despite the emergence of useful findings pertaining to state-incongruent stimuli exerting an interrupt effect and extended response latency relative to state-congruent stimuli, the sample size raises problems. Far from claiming to provide a finalized implicit measure of state, the present study merely provides initial validation of the MMS and raises interesting and novel questions regarding how best to capture current state, and how stimuli might be differently processed dependent on ones meta-motivational state.

Any attempt at measuring or assessing an individual's meta-motivational state has the potential to induce a reversal, for example, through satiation if the task is too long or repetitive, through frustration by being interrupted to measure current meta-motivational state, or through contingent events increasing the individual's awareness of being assessed or changing task to complete the measure. This highlights an issue with the use of not only the MMS but all existing measures of meta-motivational state; being seated in a laboratory, at a desk, typing at a computer and responding to the color of stimuli as quickly and as accurately as possible may be associated more with a telic or conformist state. Administering an assessment itself may act as a contingent event causing a reversal to a state more associated with achieving goals, being focused on a task, following rules, or being focused on the self (e.g., telic, mastery, conformist, or autic state). This concern is consistent with comments made by other reversal theorists, for example Desselles and Apter (2013) note that at any given time "there will be internal processes that are concurrently having an effect on images and thoughts on the one hand and the satiation process on the other" (p. 47). An implication of this internal changeability, which Apter terms 'behavioral indeterminacy', is that it is difficult to ascertain with confidence the state a participant is experiencing. The implications of the difficulty of measuring states for the falsifiability of reversal theory further highlight the need for ongoing work in this area.

Despite the inconsistent results presented, we posit that continuing the development of an implicit measurement of meta-motivational state may be a fruitful line of research in the pursuit of robust meta-motivational state measure. Implicit measures do not require the individual to be fully conscious of their state (Asendorpf, Banse, & Mucke, 2002), be aware of the attitude being measured (Brunel, Tietje, & Greenwald, 2004), or have control over the measurement outcome (Fazio & Olson, 2003). Thus, the hurdle to overcome is the prevention/limitation of measurement-induced reversals. It is posited that the variety of implicit measures available (e.g., IAT, Stroop tasks, word association) provide scope for minimal impact of contingent events. For instance, they offer ease and accessibility of use, reduce goal directed behavior and environmental effects (e.g., their use on mobile

devices as opposed to a computer/laptop) whilst the speed of the test can reduce satiation induced reversals, which may be more associated with completing longer explicit questionnaires. Whilst it is clear how an implicit measure of state would be used for laboratory-based research, it would need careful presentation in an applied setting; validating the MMS under such conditions and seeking feedback on how best to introduce it to users would be a useful avenue for future work, and should draw from existing guidelines concerning implicit measures in applied contexts (e.g., Maio, Haddock, Watt, & Hewstone, 2008). We encourage other reversal theorists to reproduce and validate the MMS in a laboratory setting to advance our field of enquiry.

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