Measuring cognitive and behavioural habit systems of entrepreneurs

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Abstract

The Literature on entrepreneurial mindsets demonstrates the importance of cognitive adaptability and self-regulation in decision making for enterprise growth (Haynie, Shepherd and Patzelt (2012). While the rigid nature of habit systems is well established in the literature, research in psychology observes cognitive interventions for shifting mindsets. Verifying findings of a qualitative study, which showed the powerful influence of founder habits on emergent routines in business enterprises, the purpose here is to present the development of a new multiple-item measurement instrument designed to assess the impact of habits and behaviour of business founders on business practices and organizational routines. The study aims to foreground flexible thinking and ability to change mindsets.

A mixed methods study, the design is informed by constructs and themes emergent from a preceding longitudinal qualitative study capturing entrepreneurial thinking and behaviour. New scales were deployed alongside existing scales for measuring cognitive flexibility and other attributes. The survey provided a small but meaningful data set able to show the impact of habits and behavioural dispositions on business practices and firm performance. Rigidity of thought impacted performance while self-awareness and ability to change habits of thought was evident and positively impacted firm success.

Use of principal components analysis in correspondence with the Oblimin rotation method is acknowledged as constrained by sample size. The paper includes implications for entrepreneurship education, specifically facilitating exploration of the mindset of the entrepreneur and support of their development towards more flexible thinking and behavior. We have started the process of developing a new scale that focuses on the influence of entrepreneurial preferences on business practices, rather than on entrepreneurial competencies per se. This is a novel and important step in entrepreneurship research.

Keywords: Habits, routines, behavioural dispositions, entrepreneurs, mindsets
1. Introduction

This paper presents an original scale that measures the habits of thought and behavioural dispositions of business founders and using this scale, explores the relationship between the cognitive and behavioural habits of business founders and business success. The proposed scale builds on the findings of a three-year qualitative study (Dollimore 2016), which posited habits of thought and behavioural dispositions as the origins of organizational routines and demonstrated the extent to which they shaped routines and impacted firm performance. Using existing scales to help capture the entrepreneurial mindset, the developing scale has also been specifically fashioned and richly informed by insights from targeted groups of business founders in both the qualitative and follow-up quantitative studies. We believe that this original scale also captures the important link between thinking and behaviours; a relationship that has been overlooked in many existing measurement instruments.

The study was inspired by evolutionary economist, Sidney Winter (2012 p. 1403), who observed that in order to understand the origin of routines and organizational capabilities we must first ask what preceded these in time and what mechanisms account for the transition. Accordingly, the hypothesis here is grounded in the modern evolutionary approach that conceives of habits and routines as social replicators and their transition and transformation explained through processes of variation, inheritance and selection (Aldrich et al 2008; Hodgson and Knudsen 2010). In addition to the rich body of work on routines that similarly adopt a dynamic approach (Becker 2004; Feldman and Pentland 2003: Pentland and Feldman 2005, 2007; Lazaric 2008) the approach and analysis are also informed by the imprinting literature (Stinchcombe 1965; Marquis and Tilcsik 2013; Bryant 2014a) pertinent research in psychology (Neal et al 2006; Wood and Neal 2007,
Adopting the much sought-after dynamic approach (Bandura 1999) that counters limitations of population ecology and other more deterministic evolutionary theories (Dollimore 2006), through the modern evolutionary approach that acknowledges the role of agency and structure, the study also addresses the central question in entrepreneurial cognition research identified as “how do entrepreneurs think?” (Mitchell et al 2007, p.3). Correspondingly, consistent with Fiske and Taylor’s (1984) social cognition theory and its four major social cognitive categories of person, situation, cognition, and motivation, through semi-structured interviews with founding entrepreneurs, the research project addresses Krueger’s (2007) “what lies beneath” plea to explore the deep-seated beliefs that shape entrepreneurial thinking and explore how these might change and develop mindsets.

Through the exploration of entrepreneurial habits and emergent themes of self-awareness, flexible thinking, and cognitive intervention, this study contributes to the entrepreneurial cognition research stream (Mitchell et al 2007). Through the novel focus on cognitive intervention and how entrepreneurs alter their habits of thought, it extends important work on entrepreneurial metacognitive processes (Haynie et al 2010; Bryant 2007; 2014b). In the context of on-going debates regarding the ‘micro-origins’ and determinants of organizational capabilities (Felin et al, 2012; Winter 2011) this work also addresses important questions relating to the individual micro-foundations of habits and routines and sheds new light on the origin of routines question.
The next section presents the research context and theoretical framework outlining the evolutionary perspective and the complementary research in psychology and entrepreneurship that fore-front the links between thought and behavior, habits and routines and ultimately their impact on business practice. Section 3 presents a summary of the qualitative research that informed the quantitative study presented here, and Section 4 and 5 present the rationale and methods deployed in this second part of the research project. This is followed by Section 6, which discusses the scales used and Section 7, which describes the sample. Section 8 presents the analyses, Section 9 outlines the results, Section 10 presents the discussion, limitations and future research and Section 11 concludes the paper.

In summary we describe the development of the instrument through the mixed method research approach, discuss its implications for business founders and business success, and offer suggestions for further development and testing and future research.

2. Theoretical Framework

*Routines*

Routines have long featured as basic elements of evolutionary theories of socio-cultural evolution (Veblen, 1914; Campbell, 1965). An enduring and important conceptual construct in the strategy and management literature (Becker 2004) the replicating organizational routine is widely understood as the DNA of the business. Conceived as source of variety and functioning as organizational memory (Cohen and Bacdayan, 1994) routines are also recognised as important drivers of behaviour in organizations (Nelson and Winter, 1982) that influence both stability and change (Feldman 2000; Feldman and Pentland, 2003).
From an evolutionary perspective, through the intertwined mechanisms of variation, inheritance (knowledge transfer) and selection, routines both sustain and transform the organizations of which they are a part and come to explain the diversity of the industry to which they belong. Those routines that render their organization best adapted to the prevailing environment will be the ones that survive and replicate through successive rounds of market competition. Routines are defined by evolutionary economists, Hodgson and Knudsen (2010, p. 241), as:

…organizational dispositions to energize conditional patterns of behaviour and interaction within organizations, involving sequential responses to cues that are partly dependent on social positions in the organization.

Organizational routines involve interaction with one or more others, are impacted by the social and political context, and exist at the concrete and the tacit level (Lazaric, 2000). Whatever their dimension, it is recognised, that like habits, routines are persistent, they multiply and they contain ready-made solutions to frequently occurring problems (Knudsen, 2008: 125). Routines are the subject of growing interest in the management literature and yet there has been minimal research on their origins (Winter, 2012).

**Habits**

As a foundational information-carrying entity, habits are conceived here as elemental social replicators. Indeed for evolutionists, habits are the fundamental, individual-level building blocks from which organizational routines emerge (Knudsen, 2008). Hence their importance as the focus of this study.
While similarities have been noted above in relation to the evolutionary approach and the implicating role of the replicating entity, it is important to distinguish between habits and routines when referring to causal mechanisms. It is not proposed in this study that individuals or habits are source of organizational routines. Other material and social factors impact here. We are seeking to determine the extent to which founder habits and dispositions shape the establishment and development of organizational routines, engagement with which requires more than one person. Following Lazaric (2008:2011) on micro-cognitive foundations and routinization in the context of the methodological individualism versus methodological collectivism debate, routines are understood here as pertaining to organized groups rather than individuals. As Lazaric asserts, “[R]outines lie between the individual and the firm levels of analysis because organizational routines are enacted by individuals in a social context” (2011, p. 147). Consistent with social cognition theory (Fiske and Taylor 1984) and observations in the entrepreneurial cognition research stream (Mitchell et al 2007 p. 12), for the most part the routines literature follows a dynamic tradition and takes account of the interplay between agency and structure (Nelson and Winter, 1982; Becker 2004; Feldman 2000; Pentland & Feldman 2005; Pentland et al, 2012; Howard-Grenville 2005).

To be clear, while this research project is focused on individuals, notably founding entrepreneurs, this is with the purpose of ascertaining what it is in terms of habits, values and experience that they bring to the establishment of routines in their new enterprise. It is not a study in methodological individualism. Indeed, as the qualitative research shows, it takes full account of the range of factors that shaped entrepreneurial habits and cognitive maps prior to the formation of their business venture. This includes formative childhood experiences, education and training. Significantly, this research pays special attention to
the habits of thought of founding entrepreneurs and how these impact the formation of routines in the business context.

Like routines, behavioural habits, and habits of thought, replicate and all are difficult to observe since they exist at the level of both potentiality and expression. In psychology, habits are described by Oulette and Wood (1998) as behavioural dispositions to repeat well-practiced acts in stable circumstances that have developed their automaticity through repeated performance in recurring contexts. While more recently, for Neal et al (2006 p.198) they are defined as “automated response dispositions that are cued by aspects of the performance context (i.e., environment, preceding actions)”. Encapsulating both is the definition adopted here by Hodgson and Knudsen (2010),

[A] habit is a disposition to engage in previously adopted or acquired behaviour ... that is triggered by appropriate stimulus or context’ (Hodgson and Knudsen, 2010).

Entrepreneurial Cognition

According to Mitchell et al (2007), from its foundations in cognitive psychology, it was the advent of Social Cognition Theory (Fiske and Taylor 1984; Bandura 1986) that enabled the socioeconomic linkage between “thinking” and “doing” necessary to the study of entrepreneurial cognitions. This provided the theoretical framework to explore the possibility previously inspired by James (1890) of changing or altering behaviours by altering attitudes of mind. Indeed it was suggested by Mitchell et al (2007, p. 14) that “individuals who understand the thinking patterns related to entrepreneurship…can alter their own thinking patterns accordingly”. However, while entrepreneurial cognition is an advancing research stream only a limited number of scholars (Haynie et al 2010; Bryant

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1 See Cohen and Bacdayan (1994) and Lazaric (2008) on procedural and declarative memory.
2007) have attempted empirical exploration of the mechanisms involved in conceptualising and changing the habits of thought at the heart of the thinking / doing nexus. For these authors, concerned with the relationship between entrepreneurial habits and routine formation, this represents an important area of interest to founding entrepreneurs and entrepreneurship educators.

**Metacognition**

Metacognition, simply put, is “thinking about thinking” (Jost et al 1998). It is defined by Schraw & Dennison (1994, p 460) as “the ability to reflect upon, understand, and control one’s learning”. Metacognition is key to explaining cognitive self-awareness, self-regulation in decision-making (Bryant 2007), and moreover, entrepreneurial adaptation (Haynie, et al 2010). Notably, for this study, when it comes to the prospect of changing our thinking, metacognition points to awareness of cognition and an understanding of strategies to change cognitions.

In an earlier work that acknowledged the dual automatic and active cognitive systems, and the capacity to shift between cognitive modes, Louis and Sutton (1991) speak of switching cognitive gears between ‘habits of mind’ to ‘active thinking’. This underpins the general principal exposed here and born out in the qualitative study, that it is possible to alter mindsets. Indeed this is what underpins successful application of cognitive behavioural therapy (Beck 2006) where individuals with guidance from a CBT practitioner confront misconceptions or maladapted assumptions and replace these with more positive, realistic and enabling cognitive maps.
Cognitive Intervention

The notion of cognitive intervention emerged from the findings of the preceding qualitative study and is informed by the literature in psychology. The problem of fixity of habits or rigidity of behaviours is explained by Cohen and Bacdayan (1994) through the distinction between procedural and declarative memory, the former being associated with automaticity and ‘know how’ (established cognitive and motor performance) and the latter associated with cognitive engagement and ‘know that’ (the facts, events or propositions) about any given activity. Empirical research highlights the impact of contextual ‘triggers’ or ‘cues’ for the procedural memory associated with habitual behaviour and remarkable lack of decay in this type of memory and the associated difficulties with changing responses in the face of the same/similar environmental triggers (Neal et al, 2006; Wood and Neal, 2009). This was seen in both studies here where respondents admitted their sometimes damaging fixed thinking and behaviours.

Recent research in psychology shows that inappropriate habits can be broken\(^2\) through the ‘strategic employment of effortful self-control’ (Wood and Neal 2007). In other words, ‘cognitive intervention’. This is especially pertinent at the start-up stages when founders are pursuing goals for their ventures and when ‘implementation intentions’ are shown to be effective tools to promote new behaviour (Holland et al, 2006). Similarly observing habits as situationally guided goal directed behaviours automatically elicited when the same situation arises, Holland et al nonetheless demonstrate through a field experiment\(^3\) that habits can be changed through conscious planning and the deliberate change in environmental ‘triggers’ or situational ‘cues’. Indeed this was born out in the qualitative

\(^2\) This study adopts Holland et al’s (2006: 777) definition of ‘breaking habits’ which is stated as, ‘stably changing an old behavior that was frequently performed within a specific context into new behavior that is repeatedly performed in that same context’
\(^3\) Holland et al (2006) undertook a field-experiment on the repetitive behaviour of employees in their recycling behaviour at a tele-company. The recycling behaviour was substantially improved following the assignment to implementation intentions conditions with results supporting the hypothesis that planning breaks down unwanted habits and creates new ones.
study; this showed that the more reflective and self-aware founders were those most able to create and respond to changed triggers and implement them in their business enterprises.

An understanding of the impetus or ‘triggers’ for adapting the mindset of nascent entrepreneurs as they negotiate the dynamic business environment is important. Management research shows that ‘integrative’ thinking (Martin 2007a; 2007b) or ‘ambidexterity’ (Tushman et al, 2011; Bryant 2014b) characterises the mindset of successful business leaders while recent research in psychology demonstrates that it is possible to change habits and behaviour (Holland et al 2006: Wood and Neal, 2007).

Accordingly, the qualitative study explored what the founder brings to the start-up enterprise in terms of cognitive dexterity and problem solving capacity, while at the same time it usefully investigated the potential for shifts in cognitive maps and identified triggers for changed behavioural responses.

3. A study of the origin of organizational routines

For the purpose of exploring the origins of organizational routines, a three-year study of start-ups was undertaken across a range of industries in a small region in the South East of England (Dollimore, 2016). Pursuing the hypothesis that entrepreneurs and business founders play a key role in the establishment of routines in their founding enterprises, the study investigated the repertoire of acquired habits, heuristics and behavioural dispositions that entrepreneurs bring to the new enterprise, and their sources (childhood, education, training). It explored how particular ‘ways of doing things’ emerged, developed and became routine within the new enterprise. Findings showed that routines are shaped by the habits of thought and behavioural dispositions of the founder, they are co-created
through negotiations between the founding entrepreneur and partners in the start-up phase of the enterprise, and they are established in the organization through repetition.

Emerging themes of interest, which informed the development of the quantitative study, were those of, metacognition, negotiation personality and cognitive intervention. Crucially, it was observed that, founders varied markedly in their capacity and preparedness to change their habits and behaviour (some more self-aware), and in how they negotiated new routines. Conscious planning was seen to break down unwanted habits and create new ones through the adoption of goals and the implementation of physical and psychological interventions and triggers.

Key findings showed that both bad and good habits of thought shaped the business enterprise and its performance. Significantly, and supporting research in psychology, it also revealed that these habits of thought and associated behavioural dispositions can change with the right environmental triggers. Findings also suggested that the most self-aware individuals are best able to shift their mind-sets and adopt the ‘integrative thinking’ type approach espoused by Roger Martin (2007a 2007b), which, pointedly, enables innovative thinking and creative solutions for business problems. Policy implications related to entrepreneurship education and training and development of the entrepreneurial mindset.

4. Rationale

In light of this, our goal is to develop a new scale to measure the cognitive and behavioural habit systems of business founders. There are, of course, many existing useful and valid measures of the entrepreneurial mindset but none, as far as the authors are aware, that consider how business founders’ patterns in thinking influence their behavioural dispositions

4 The ability to hold two opposing ideas in the mind at once and the reach a synthesis that contains elements of both but improves on each (Roger Martin, 2009)
and subsequently organizational routines and business practices. In this paper, and underpinned by the preceding qualitative study, we start the process of developing and validating a new measure to assess these constructs quantitatively, and seek to complement the existing measurement instruments that are grounded in a different theoretical base.

5. Research Method

Instrument

As outlined above, the development of the quantitative measure of habit is theoretically grounded in an evolutionary approach. This framework was complemented by research in psychology and entrepreneurship and rich insights from the aforementioned longitudinal study of 33 business founders and leaders. A process-orientated study, semi-structured interviews were conducted within two years of start-up and participants revisited for follow-up interviews to consider how and when routines became established in the business venture. The study used Interpretive Phenomenological Analysis (IPA) (Smith 1996: Smith et al 2009) to investigate the ‘lived experience’ of founding entrepreneurs\(^5\). With narrative methodology, an iterative process of coding was adopted to distinguish patterns and identify concepts and themes emerging from participant accounts.

As noted three key themes emerged from the interviews; the importance of self-awareness, its link to adaptive or flexible thinking, and possibility for all founders or business leaders to change their habits of thought through ‘cognitive intervention’. It became apparent that those business founders/leaders who were the most self-aware were best able to challenge and change their habits of thought and consequently their behavior. There was also an observed correlation between these business founders/leaders and better business performance.

\(^5\) Interpretive Phenomenological Analysis (IPA) where “the researcher is trying to make sense of the participant trying to make sense of what is happening to them” (Smith et al 2009 p. 3).
A very early observation was the impact on thinking and behavior of ‘self-awareness’. This emerged as an important construct. Individuals volunteered that they were either naturally reflective or that psychometric assessments, usually in the workplace, represented turning points in their self-awareness and development. After the notion of ‘flexible mindsets’ became apparent, ‘rigidity of mindset’ also emerged as an important construct. Another important construct was that of ‘environmental triggers’. All respondents who changed their behavior and/or their habits of thought reported some kind of environmental trigger that prompted, provoked, assisted or encouraged a new behavior – which then became habitual. These included things like a failed business, the presence of a new partner or employee, the anticipated reaction to an existing behavior from a significant other, for example, a partner or external stakeholder, or changes in physical environment.

For participants who appeared to have a degree of rigidity of thought they would describe themselves as “stubborn”, “like to do things my way”, “lazy”, “like routines, rules and systems” “set in my ways”.

Consistent with a grounded theory approach, important constructs and key themes clearly emerged from the qualitative research; we have used these to design the items of this new measurement instrument. There is evidently a capacity amongst some business leaders for integrative thinking; habits of thought can and do change, and the most self-aware business leaders are most able to change habits of thought and were the more successful.

6. Mixed methods: From qualitative to quantitative

Based on the insights from the qualitative study and the preceding rationale that organizational routines are grounded in individuals’ habits, we sought to develop a quantitative scale to measure the cognitive and behavioural habits of business founders
from a practice-perspective. Rather than focusing on competencies and measuring the strength of personal characteristics, the items were designed to measure business founders’ preferred practices and the extent to which personal competencies affect decision-making and organizational routines. Put differently, we sought to develop a scale that measures the extent to which business practices and organizational routines are an externalization of business founders’ cognitive and behavioural habit systems. Example items include ‘I like to stamp my personality on the business’, ‘Most routines in the business have been carefully crafted’.

The first iteration of the scale was composed of 32 items and constructed on a 5-point scale Likert scale anchored on the left with “strongly disagree” and on the right with “strongly agree”. Higher scores were indicative of stronger influence of the business founders’ characteristics on the organizational routines and practices or put differently, personal and organizational rigidity/habit. The measurement scale included a brief set of instructions asking respondents to indicate how much they agreed with each statement.

As well as developing a multi-item measurement scale intended to operationalize the habits of thoughts and behavioural dispositions of business founders, we also wanted to explore how the newly developed scale is distinct from existing measurement instruments. Therefore, we presented the scale in an online questionnaire alongside relevant established scales, which were used as criterion measures to assess nomological validity. These criterion measures were competency measures rather than practice measures; they measured the strength of each competency for business founders rather than measuring the influence of the competencies on organisational routines. We were focused on the latter.
**Criterion measures**

We used the Measure of Adaptive Cognition scale developed by Haynie and Shepherd (2009) as one criterion measure to assess entrepreneurs' cognitive adaptability; their ability to engage and generate multiple decision frameworks appropriate to the task at hand, and from these select the most appropriate option to meet their goals. The scale is composed of 36 items organised into 5 sub-scales that measure goal orientation; meta-cognitive knowledge; meta-cognitive experience; meta-cognitive control; and monitoring. All items were rated on an 11-point Likert scale ($1 = not very much like me; 11 = very much like me$).

We used the Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2010) to measure entrepreneurs' general ability to think adaptively when encountering challenging life events. The CFI scale is composed of 20 items designed to measure three aspects of cognitive flexibility. The first subscale measure *Alternatives* – the ability to perceive and generate alternative solutions to difficult behavior. The second subscale – *Control* – measures the tendency to perceive difficult situations as controllable. Each item is rated on a 7-point Likert scale ($1 = strongly disagree; 7 = strongly agree$) with higher scores indicating greater cognitive flexibility.

We used the General Self-Efficacy scale (GSE; Schwarzer & Jerusalem, 1995) to assess entrepreneurs’ ability to cope with daily hassles and their adaptation after experiencing stressful life events. Specifically, when answering the questions, they were asked to think about how they might cope with a difficult situation. The scale is composed of 10 items each rated on a 4-point Likert scale ($1 = not at all true; 2 = hardly true; 3 = moderately true; 4 = exactly true$). Higher scores were indicative of greater self-efficacy.
The Self-Reflection and Insight Scale (SRIS; Grant, Franklin & Langford, 2002) was used to measure entrepreneurs’ private self-conscious, reflecting one’s thoughts, feelings and behavior and insight. The scale is composed of 20 items comprised of two factors labelled Self-Reflection and Insight, each rated on a 6-point Likert scale ($1 = strongly disagree; 6 = strongly agree$). After reverse coding relevant items, total scores are indicative of greater self-reflection and insight.

We focused our assessment of business success on both financial and non-financial aspects and used a scale developed by Walker and Brown (2004) as one of our measurements. This scale is composed of 14 items presented on a 6-point Likert scale ($1 = strongly disagree; 6 = strongly agree$). These define four factors; Lifestyle (4 items) reflecting the balance between lifestyle and financial aspects; Diminished Financial (2 items) reflecting the lessening financial burden of small business ownership over time; Strong Financial (4 items) reflecting traditional financial aspects of small business ownership; and Social/Community Responsibility (4 items) reflecting small business ownership as a community responsibility rather than an individual endeavor. Higher scores were indicative of higher levels of each aspect.

We also asked business owners to identify factors that represent success for their business and rate how near to their target they were in each of these areas. This gave us a measure of the priority areas for each business.

The last section of our survey was dedicated to collecting demographic information about the business founder and their business. Questions in this section included, amongst others, the annual turnover of the business, the age of the business and its type and sector.
7. Sample

Respondents were business founders (small business owners and entrepreneurs) who were members of local and national small business networks and member organizations in the UK. There was no overlap with the sample for the qualitative study; this was a separate sample. The research was advertised in the members’ mailing list for each network and in response to these calls, respondents self-selected to participate in the research by completing the online survey. A total of sixty-three usable surveys were returned (64% completion rate). Respondents were both male \((n = 31; 51\%)\) and female \((n = 29, 48\%\); three respondents \((5\%)\) did not report their gender). The mean age in the sample was 50.31 \((SD = 9.30)\). Sixty-three percent of the respondents were sole traders, 71% were the founder of the business, 25% of the respondents had owned/managed their business for less than 1 year, and 47% of respondents had a turnover of less than £25,000.

The sample size that we were able to recruit is smaller than we desired and than what is optimal for a thorough psychometric testing and development of a measurement instrument. However, we were targeted in our approach and specifically targeted a sample of participants for whom the scale was designed (small business founders) rather than an opportunistic sample, which would have given us greater a quantity but less specificity. Considering all of the above, the analysis conducted is somewhat limited by the data available and therefore the results are interpreted as preliminary findings that form the foundations for future developments of the scale.

8. Analysis

*Overview of the data analysis*

The analysis is conducted in two parts. The first analysis explores the dimensionality of the items and the underlying factor structure and scale reliability. The second analysis is
hypothesis-based and explores the relationship between the cognitive and behavioural habits of business founders and business success.

**Scale development**

**Principal Components Analysis**

We used Principal Components Analysis (PCA) with Oblimin rotation for the purpose of data reduction and to identify the optimal factor solution from the 32 items generated from our insights from the qualitative study. Aside from the small sample size, the data proved suitable for PCA; there was a positive manifold amongst the items and the inter-item correlations were acceptable ($KMO = .58$, $p < .01$) suggesting moderate relationships amongst the items. The MSA values were overall positive and strong ($range = .30 – .78$). The communalities showed a good amount of common variance ($range = .57 - .79$). The eigenvalue criterion (as recommended by Kaiser, 1974), which overestimates the number of underlying factors, suggested the retention of ten components that accounted for 70% of the total variance ($Component 1 = 17.38\%$; $Component 2 = 13.91\%$; $Component 3 = 7.62\%$; $Component 4 = 5.88\%$; $Component 5 = 5.40\%$; $Component 6 = 5.12\%$; $Component 7 = 4.37\%$; $Component 8 = 3.85\%$; $Component 9 = 3.49\%$; $Component 10 = 3.31\%$). However, with consideration to the scree plot, the amount of variance explained by individual components, and the pattern of item loadings and cross-loadings, there appeared to be one substantial component amongst the items. Subsequently, items that showed minimal factor loadings (< .40) were systematically eliminated. We were most stringent in our cut-off for factor loadings to account for the less than optimal sample size.

A second PCA with Oblimin rotation was conducted with one factor specified. This accounted for 17% of the total variance and included 14 items all with factor loadings > .40 (see Table 1). A one-dimensional factor solution was accepted.
Table 1.

Component loadings on a one-factor solution following PCA

<table>
<thead>
<tr>
<th>Item</th>
<th>Loading</th>
</tr>
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<tbody>
<tr>
<td>I am not good at challenging my superiors</td>
<td>.75</td>
</tr>
<tr>
<td>I don’t like change</td>
<td>-.71</td>
</tr>
<tr>
<td>I believe I have strong powers of persuasion</td>
<td>.66</td>
</tr>
<tr>
<td>Against strong personalities, I usually back down</td>
<td>.62</td>
</tr>
<tr>
<td>I am not good at voicing my opinion when I know it conflicts with others</td>
<td>-.61</td>
</tr>
<tr>
<td>If I believe in a best way to do something I can usually push it through</td>
<td>-.60</td>
</tr>
<tr>
<td>Even if I know I am right, I find it difficult to counter opposing views</td>
<td>.57</td>
</tr>
<tr>
<td>If someone opposes me I can usually find the means to get what I want</td>
<td>.53</td>
</tr>
<tr>
<td>I like to go with the flow</td>
<td>.46</td>
</tr>
<tr>
<td>Most routines in the business have been carefully crafted</td>
<td>.45</td>
</tr>
<tr>
<td>I would like to be more confident in my opinion</td>
<td>.45</td>
</tr>
<tr>
<td>Most routines in the business have been a mixture of planning and emergence</td>
<td>.44</td>
</tr>
<tr>
<td>I like to stamp my personality on the business</td>
<td>-.44</td>
</tr>
<tr>
<td>I do not like conflict</td>
<td>.42</td>
</tr>
</tbody>
</table>

Items in italics were subsequently removed from the scale due to reducing the Cronbach’s alpha value

Reliability

A scale is reliable if it yields consistent measures over time (Straub, 1989). There are several types of reliability, and internal consistency is used most frequently in the social sciences. Reliability of the three sub-scales was tested using Cronbach’s alphas, which were calculated based on the average inter-item correlations. We adhered to the generally agreed lower limit of Cronbach’s alpha of .70 as a cutoff for item retention (Nunally, 1978). More lenient criterion can be used for instruments that are in the early stages of development.
(Nunally & Bernstein, 1994). Our findings indicate that the 14-item scale had lower than desirable item reliability therefore a process of item removal was followed until the Cronbach’s alpha value was higher than .70. This process resulted in a further three items being removed (these are indicated in Table 1).

Following the factor and reliability analyses, the final item pool for the scale was composed on 11 items with a Cronbach’s alpha value of .70.

**Validity**

Robust tests of validity focus on validity both within the measure (between factors) and between measures (through comparisons with other, distinct measures). Tests of validity that were performed focused both within the sub-scales and through comparisons between the sub-scales and other measures (nomological validity). There were sufficient levels of within and between structural validity.

Within structural validity is demonstrated when the measures that are theoretically supposed to be highly interrelated are demonstrated to be highly interrelated (Nunally & Bernstein, 1994). Within structural validity has been demonstrated by the high factor loadings (> .50) and few cross-loadings (Chau & Tam, 1997).

Nomological validity (between measure validity) was established by comparing the correlations between the sub-scales and the criterion measures included in the questionnaire, specifically the Measure of Adaptive Cognition (MAC; Haynie & Shepherd, 2009), the Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2009), the General
Self-Efficacy scale (GSE; Schwarzer & Jerusalem, 1995) and the Self-Reflection and Insight scale (SR&I; Grant, Franklin & Langford, 2002).

Theoretically, we would expect respondents’ scores on the cognition and behaviour habit scale to be negatively correlated with scores on the MAC sub-scales. Haynie and Shepherd’s (2009, p.695) MAC scale assesses cognitive adaptability and one’s ability to be “dynamic, flexible and self-regulating in one’s cognitions given dynamic and uncertain task environments”. Higher scores across the goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring sub-scales are indicative of greater flexibility and dynamism in thinking. We would expect business founders and leaders who are more decisive and confident to be less flexible and dynamic in their thinking. Our expectations were largely confirmed; we found weak, negative, and nearly statistically significant correlations between the habit scale and four of the MAC scales (MAC choice was the exception, see Table 2).

In line with expectations, we found a negative relationship between respondents’ scores on the habit scale and the Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2010), General Self-Efficacy (GSE; Schwarzer & Jerusalem, 1995) and Self-Reflection and Insight (SRI; Grant, Franklin & Langford, 2002). Indeed, business founders who are more habit-bound in their thinking and behaviour are likely to be less flexible in these regards; they are likely to be more focused and rigid, and therefore more ‘routine’ in the way they make decisions, offering fewer opportunities to reflect. Furthermore, this rigidity might, in part, be accounted for by their lower levels of self-efficacy; business founders who have a lower self-belief in their ability to cope and adapt to challenging events as they occur might routinely stick to the same decision-making practices and, therefore, become more decisive and confident in their approach (even if they don’t make the most optimal decisions).
Table 2.

Intercorrelations amongst the habit scale and the criterion scales

<table>
<thead>
<tr>
<th>Scale</th>
<th>1.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Habit scale</td>
<td>-</td>
</tr>
<tr>
<td>2. MAC Goal orientation</td>
<td>-.24</td>
</tr>
<tr>
<td>3. MAC Knowledge</td>
<td>-.23</td>
</tr>
<tr>
<td>4. MAC Experience</td>
<td>-.25</td>
</tr>
<tr>
<td>5. MAC Choice</td>
<td>.02</td>
</tr>
<tr>
<td>6. MAC Monitoring</td>
<td>-.24</td>
</tr>
<tr>
<td>7. Cognitive flexibility</td>
<td>-.38**</td>
</tr>
<tr>
<td>8. Self-reflection &amp; Insight</td>
<td>-.22</td>
</tr>
<tr>
<td>9. Self-efficacy</td>
<td>-.29**</td>
</tr>
</tbody>
</table>

*p<.05; **p<.01

9. Results

To further explore the insights gained from the qualitative study, whereby more successful entrepreneurs were the most self-aware and prepared to change their mindset, we explored the relationship between scores on the habit scale (as a reflection of rigidity in cognition and behaviour) and business success as measured by annual turnover. The results confirmed our expectations. We found that more successful business founders were less rigid/more flexible in their decision-making (see Table 3). Specifically, we found a negative linear relationship between cognitive and behavioural rigidity and business success such that the founders of businesses that were reported to be less successful were more inflexible (had higher habit scores) compared with the founders of businesses that were reported as more successful. In follow-up comparisons we found that the founders of businesses with the lowest turnover were the most rigid in their thinking and behaviour compared with founders of businesses with medium and high turnover (t(45) = 2.65, p = .01 and t(38) = 2.16, p = .04, respectively) but there was no difference in the rigidity of thinking and behaviour between moderately successful and highly successful businesses (t(29) = 0.06, p = .95).
We also conducted the same analysis on the established scales measuring metacognitive ability, self-reflection and insight, cognitive flexibility, and self-efficacy and found one result that was near to being statistically significant; this was for metacognitive experience (see Table 3). This, again, suggested that the founders of more successful business were less reliant on established idiosyncratic experiences and preferences compared with founders of less successful businesses. Put differently, businesses founders of more successful businesses were more flexible in their approach.

Table 3.

One-way ANOVAs of scale scores according to business success

<table>
<thead>
<tr>
<th>Scale</th>
<th>Business success</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low turnover (&lt; £25,000)</td>
</tr>
<tr>
<td>Cognitive and behavioural habit</td>
<td>32.29 (6.00)</td>
</tr>
<tr>
<td>MAC Goal orientation</td>
<td>44.54 (8.17)</td>
</tr>
<tr>
<td>MAC Knowledge</td>
<td>92.89 (13.52)</td>
</tr>
<tr>
<td>MAC Experience</td>
<td>72.46 (8.43)</td>
</tr>
<tr>
<td>MAC Choice</td>
<td>43.18 (7.69)</td>
</tr>
<tr>
<td>MAC Monitoring</td>
<td>59.39 (10.60)</td>
</tr>
<tr>
<td>Cognitive flexibility</td>
<td>112.61 (13.61)</td>
</tr>
<tr>
<td>Self-reflection &amp; Insight</td>
<td>88.93 (18.33)</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>34.64 (3.18)</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01.
10. Discussion

The focus of this paper has been developing and validating a new scale to measure the cognitive and behavioural habit systems of business founders and entrepreneurship. In an approach strongly grounded in theory, we have started the process of developing a new scale to measure entrepreneurial preferences, and explore how these influence business practices. The focus of the developed scale is different from established measures because it focuses on practices rather than competencies and also considers cognitive and behavioural preferences in correspondence. Using the newly developed scale, we have built upon the preceding qualitative study and explored the influence of business founders' cognitive and behavioural preferences (habits) on business success.

Validating the findings of the three-year study of business founders, the above analyses start the process of rigorously exploring the relationship between cognition and behavior, and flexibility and rigidity in relation to business success. Our main finding, which is again born out in the qualitative study, is that business founders who are more concise/decisive (rigid in decision-making) are running less successful businesses (as measured by annual turnover).

Significantly, we have started the process of developing a new scale that focuses on the influence of entrepreneurial preferences on business practices, rather than on entrepreneurial competencies per se. This is a novel and important step in entrepreneurship research. The established scales that we have used as criterion measures are based on competency models whereas the newly developed scales presented here are usefully looking at business success from a practice-perspective.
Finally, the measure elaborated here has important implications for the pedagogy and support of entrepreneurship. It suggests a strong link between cognitive flexibility and successful entrepreneurship performance. Awareness of their cognitive and behavioural ‘rigidity’ coupled with the knowledge that there is potential to change suggests opportunity for improved performance for the entrepreneur or business leader. Implications for educators and policy-makers suggest timely and well-targeted entrepreneurship education that helps explore the mindset of the entrepreneur and support their development towards more flexible thinking and behavior.

11. Potential limitations and future research
A significant limitation of this study is the use of principal components analysis as the chosen method of data reduction and analysis; specifically, the appropriateness and utility of principal components analysis in correspondence with the Oblimin rotation method (as opposed to other exploratory factor analyses and rotational methods). We note that alternative methods of factor analysis that explain the common variance, as opposed to the total variance, are preferred. But in relation to this, we also highlight that our chosen methods (as to extraction method and rotation) were based on the most accepted assumptions about factor analysis techniques in cognitive and social psychology (consistent with Reis & Judd, 2000) and with consideration to the smaller than optimal sample size. This is the start of our research on developing this scale and our plans for further quantitative research, which are now justified in light of the findings presented here. That is, to include administration of the 11-item scale to a larger sample of business founders for the purpose of confirming the scale properties, and to further explore the relation between business founders’ cognitive and behavioural habit systems and business success.
12. Conclusion

This paper outlined a mixed method approach to the study of the habits and dispositions of business founders and entrepreneurs, which included a three year qualitative study followed by a quantitative survey informed by emergent constructs and themes. The main focus of this paper was the development of a new scale, which its authors sought to help demonstrate the importance of habits of thought on business performance and which we believe will also offer a reliable and valid scale for the community of entrepreneurship scholars interested in the mindset of the entrepreneur.
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