THE POWER OF ENTREPRENEURIAL IDEAS: NECESSITY, ENABLEMENT AND THE INTENTION MODEL

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ABSTRACT
This paper uses survey data from employees and contractors at the Dounreay Nuclear Power Station in Scotland to test the explanatory power of the Entrepreneurial Intention Model under conditions of economic necessity, and in the process to explore Shapero’s notion of displacement in the movement of individual from a relatively passive state of intention to action. The early work of Shapero (1983) introduced the concept of displacement that suggests that external conditions can introduce shocks that would precipitate the active pursuit of entrepreneurship. Subsequent work on the Intention Model has focused attention mostly on cognitive processes of the individual in earlier stages of intention development, and little is known about the role of displacement. This work postulates that adverse external economic conditions can have an independent influence on the active search for entrepreneurial ideas, and that both the negative effect of facing loss of employment and the positive, empowering effect of finding ideas are displacement factors that lead to substantially higher levels of entrepreneurial intention and taking action to start a company. The research uses survey data provided by 384 of the approximately 1500 individuals working at Dounreay in 2007, and tests for the effects on intention using structural equation modelling. The results confirm that perceived necessity and having found an idea for a new company have effects independent of desirability and self-efficacy. The conclusion argues that there is an early stage of intention development that can only take the individual to a pre-disposition towards following entrepreneurship that, following Shapero, may require negative or positive displacement to be crystallised into action.

INTRODUCTION
The Dounreay Nuclear Power Station began operation on the north coast of Scotland in 1958. The UK Atomic Energy Authority placed it there both as a safety measure to keep what was viewed as, however small, a potential risk that should be distanced from large population centres, while serving as a source of economic benefit to a rural agricultural area with very little industry. Having now out-lived its design life, the facility is being decommissioned, and the workforce is slowly but steadily being released. Those who are older may consider early retirement, and hope that years of service will be rewarded by generous stipends for early retirement, but the lion’s share of 1,500 employees and contractors (hereafter employees) at Dounreay, constituting 20% of all employment in the local area and 30% of the local payroll, will need to find new work. Although the Dounreay employees express a strong preference for the pace and lifestyle of the area, given the likely effects of the loss of the Dounreay payroll the prospects of most employees finding employment in existing businesses would seem to be rather doubtful. In light of the limited local employment opportunities the United Kingdom Atomic Energy Authority has taken the position that the alternative to leaving the Dounreay area to find employment elsewhere is that many should become entrepreneurs (Macfarlane, 2007).
These circumstances provide an opportunity to study both necessity- and opportunity-based entrepreneurship as sources of displacement, precipitating potential entrepreneurs into active ones. A discussion of the role of displacement in entrepreneurship development is first found in the work of Shapero (1975) who suggested that individuals might have the potential to be entrepreneurs, but it takes a negative or positive event to move them to a path of active intention to start a business. Krueger (1993) and Krueger and Brazeal (1994) developed this idea further, but since that work there has been little use of the displacement concept in the literature. By contrast, there has been considerable attention given to Shapero’s view (Shapero 1975, Shapero and Sokol 1982) that desirability and feasibility are the dominant predictors of entrepreneurial intent. This paper takes advantage of the economic conditions at Dounreay and the empowering effects of arriving at an idea for a company, under conditions of necessity, to study positive and negative forms of displacement, and the possibility that displacement plays a unique role in heightening intention.

The paper first briefly reviews the literature supporting the importance of intention in the study of entrepreneurship, and reports on research on the role of displacement in entrepreneurial intention models (Shapero 1975, Shapero and Sokol 1982, Krueger 1993, Krueger and Brazeal 1994). Then a linked set of hypotheses is offered that together constitute an intention model under conditions of necessity (negative displacement). The model includes the effects of entrepreneurial role models and having an idea for a new company, which is seen as empowering the individual (positive displacement). Regression analysis and structural equation modelling is then used to analyse survey data from 384 Dounreay employees by first presenting a baseline model that assumes the effects of displacement on intention are like other demographic, experience and attitudinal factors in that they are mediated by self-efficacy and desirability. The second model shows there is a substantially improved goodness-of-fit with the data when displacement is assumed to have direct as well as mediated effect on entrepreneurial intention. A concluding discussion argues that the Intention Model may be seen as having two states, one for the early formation of intention, when no displacement forces are present, and a second stage, when the individual is subjected to economic or empowering forms of displacement.

A MODEL OF ENTREPRENEURIAL INTENTION

There is a long tradition placing entrepreneurial intention at the centre of the study of entrepreneurial development (Bird 1988, Bird and Jelinek 1988, Boyd and Vozikis 1994, Krueger et al. 2000, Krueger and Carsrud 1993, Robinson et al. 1991) that shows steady progress in advancing a robust formal model of intention development. Robinson et al. (1991) suggest that in general an approach to understanding entrepreneurship based on attitudes is superior to relying on demographic and personality factors, and Bird (1988) focuses on the central importance of intention as a predictor of entrepreneurial behaviour. Bird and Jelinek (1988) suggest that there are precursor attitudes and social norms that shape entrepreneurial intention in a particular context, and Boyd and Vozikis (1994) discuss the importance of self-efficacy in predicting intention. Krueger (1993, 2000) has led the development of the full intention model, characterised by the primacy of entrepreneurial-specific perceived self-efficacy and perceived desirability as predictors of entrepreneurial intention.

Perhaps the best established formal model of what predicts entrepreneurial intention begins with the work of Shapero (1975) who believes that the major factors that predict the act of starting a company are its desirability and feasibility (Shapero and Sokol 1982). In his view the most powerful influence establishing whether individuals feel that their starting a business is credible and subsequently desirable is the individual’s family, and in particular having a father or mother that has been a company owner, farmer, or independent professional. Looking more broadly, having peers, classmates and colleagues who are entrepreneurial, coming from entrepreneurial ethnic groups and having previous work experience in small companies as a manager, all increase the self-belief that individuals have that they can become entrepreneurs. His view of the sources of an individual’s belief that entrepreneurship is desirable is less well developed compared to later research, but he makes an important point that is usually neglected in subsequent models of entrepreneurship: perceptions of desirability and feasibility interact.

He asserts that desirability and feasibility alone are not sufficient to explain whether and when an individual actively begins to start a business because it requires some event that precipitates
a change in the individual’s career path. He reports that, “in this author’s field research only one of the hundreds of entrepreneurs interviewed claimed to have planned a step-by-step process leading to the formation of a business, though many reported that they had often thought about it” (Shapero and Sokol 1982, 82). Such events can be the arrival at some crossroads, such as completing school or leaving military service; negative displacements that include being fired or insulted by one’s superior in a company; and positive displacements such as the appearance of an excellent opportunity.

Krueger (1993) presents Shapero’s model in a set of hypotheses that the breadth and positiveness of entrepreneurial experiences represent predictors of perceived desirability and feasibility, and that these factors in turn predict entrepreneurial intention. This formulation assumes that there are background factors, experiences, attitudes and norms that predict the desirability and feasibility of entrepreneurship, and that these two factors predict intent to start a company in what might be thought of as the classic Intention Model of entrepreneurship. Using survey data collected from 126 upper division business students, Krueger (1993) finds that these prior factors show no consequential direct relationship with intention, suggesting that any influence they might have on intention is only through the magnitude of their impact on desirability and feasibility. Desirability and feasibility are then said to mediate the influence of the other variables on intent. He also finds, however, that the Desirability to Act (Burger 1985), a proxy measure for Shapero’s concept of Propensity to Act, has a direct relationship with intention, and he shows that there is an interactive effect with the intention model taking quite different forms under conditions of high and low Desirability to Act among the students he is studying.

Krueger and Brazeal (1994) subsequently explore the underlying theory of Shapero’s model (Shapero and Sokol 1982) with a specification of how the various concepts in Shapero’s paradigm might relate. They see Shapero’s model (see Figure 1) as based on the assumption that individuals are guided by inertia that holds them on a particular path until some force disturbs them. The model begins with desirability and feasibility (see Figure 1), in this instance showing parenthetically that the definition of feasibility is essentially synonymous with self-efficacy (Bandura 1986, 1997). These variables are said to predict “Credibility”, followed by “Potential” and then “Intentions”. Only if one has a disposition for action does one’s credibility grow into a readiness for entrepreneurship. At the next stage, the “potential” entrepreneur has “a preexisting preparedness to accept” (Krueger and Brazeal 1994, 91) and act upon an entrepreneurial opportunity that is personally attractive. Individuals with this readiness are thought to remain potential entrepreneurs until they are displaced from their career paths by negative or positive displacement events. Following the occurrence of a precipitating event, the once potential entrepreneur takes on an active intention and takes actions to start a business.

Figure 1: Model of Entrepreneurial Potential and Intention
(Taken from Krueger and Brazeal 1994, 95)

The relationship between Displacement and Intention
While the role of Propensity to Act in this model (Krueger and Brazeal 1994) has received further attention (e.g. Krueger et al. 2000), the bulk of subsequent research has continued to explore what predicts desirability and feasibility, and among other questions whether the influence of other factors on intention are mediated by desirability and feasibility. In their paper advancing how one should approach self-efficacy and intention, Boyd and Vozikis offer
propositions drawn from Bandura’s work on self-efficacy that include the importance of “repeated performance accomplishments” and the presence of role models for increasing entrepreneurial self-efficacy, when, “Proficient role models convey effective strategies for managing situations” (1994, 67). Peterman and Kennedy (2003) support the Shapero assertion that positive breadth of prior experience predict entrepreneurial desirability and feasibility, but do not include a measure of intention in their study. Zhao et al. (2005) model the effects of formal learning, entrepreneurial experience, risk propensity, and gender in a pre- and post-study of entrepreneurial self-efficacy and intention, and found that these factors, except gender, are mediated by self-efficacy, having an effect on intention only through their effect on self-efficacy. Émin (2006) uses structural equation modelling and data collected from French researchers to show that feasibility and desirability predict intention, and Urban (2006) finds that the effects of diverse cultures in South Africa on intention are largely mediated by self-efficacy. Krueger (2000) and Krueger et al. (2000) study outcome expectation, desirability, propensity to act, self-efficacy and feasibility.

While research thus continues on the intention model, there is not a great deal of attention given to the role of displacement. Boyd and Vozikis (1994) only make a brief reference to displacement. Krueger (2000, 9) shows the role of precipitating factors in his intention model, and mentions factors that might have a displacement effects, but the later research cited above does not consider a role for displacement.

This study returns to Shapero and Sokol’s (1982) displacement concept and tests its role in a formal model of entrepreneurial desirability, self-efficacy and intention. The need for new work at Dounreay varies from very low, particularly for older employees (Lucas et al. 2007), to a feeling of great urgency that provides a meaningful measure of negative displacement. The form of positive displacement is whether they have arrived at an idea for starting a company. While the necessity to find new work is almost certainly going to heighten search for and alertness to new ideas, there is only so much one can do until the individual has a specific idea. Once an individual has found a clear and workable opportunity, it is likely to enable an individual to understand the tangible tasks that are needed to start a particular new business implementing those ideas, something likely to strengthen intention and lead to the engagement in identifiable entrepreneurial behaviours.

Once these variables are placed in a model, one can address the question of whether there is a qualitative difference between those experiencing displacement by asking if their effects on intention are mediated by self-efficacy and desirability. If displacement only effects intention indirectly, it is one of many factors that influence intention through increases in self-efficacy and desirability. If displacement events or processes have a step-level effect on intention, moving individuals from a potential to a more active state, one would expect a need for new work and the identification of an actionable entrepreneurial idea to have a significant independent effect on intention and action pursuing that goal.

The specification of 14 propositions and 13 paths of relationships that follow are based on prior work on the intention model that detail the predicted relationship among a form of breadth of entrepreneurial experience, the perceived urgency of a need to find new work, whether the individual has an idea for a new venture, self-efficacy, desirability and intention.

Hypotheses consistent with the mediated model, with only self-efficacy and desirability affecting intention, are:

1. Breadth of contact with entrepreneurial experiences of others (Shapero and Sokol 1982) including father, mother, other relatives, peers and colleagues) leads to higher levels of desirability (H1a) and self-efficacy (H1b). Its effect on intention is mediated (Zhao 2005), and it has no direct effect (H1c).

2. Economic necessity is a form of negative displacement on intention (Shapero and Sokol 1982) that will increase the desirability of entrepreneurship (H2a) as well as intensify the search for ideas for starting a business, so those feeling the need to find new work will then have more ideas (H2b). Those with high self-efficacy are able to accept the existence of necessity more fully, and will be motivated sufficiently by necessity to engage in search behaviour that together will show a relationship.
3. Self-efficacy is related to both conscious and nonconscious alertness (Kirzen 1979, Herron and Sapienza 1992), and those with higher self-efficacy are more likely to have ideas for starting a company. Those with workable ideas are empowered and have higher self-efficacy, suggesting a reciprocal relationship (H3).

4. Following Shapero and Sokol (1982), self-efficacy and desirability interact. Those with lower self-efficacy are less likely to desire that which may not seem attainable. Those that have a high desire to be an entrepreneur are likely to seek out experiences that strengthen self-efficacy. As shown in the model presented by Boyd and Vozikis (1994, 69), the relationship may be reciprocal (H4).

5. Desirability of entrepreneurship will motivate interest and increase the likelihood of finding an entrepreneurial idea, while having an idea enables increased desirability. This may therefore be a reciprocal relationship (H5).


Figure 2: An intention model with displacement effects

Hypotheses that assume that displacement changes the nature of intention beyond the effects of desirability and self-efficacy (shown with heavier arrows) are:

7. Necessity of finding new work has a direct positive effect (H7) on intention (Shapero and Sokol 1982).

8. Having an idea for a new company has a direct positive effect (H8) on intention (Shapero and Sokol 1982).

The task is both to see if the Dounreay data supports the presence of relationships as stated, and to see if the size and pattern of the relationships confirms or supports the view that displacement has a consequential impact on entrepreneurial intention above and beyond the effects of desirability and self-efficacy.

METHOD

This research relies on the use of structural equation modelling of survey research data collected at the Dounreay nuclear facility now managed by Dounreay Site Restoration Ltd. The survey administered in 2007 included the core elements of the intention model: the desirability of different aspects of entrepreneurship, how confident individuals were that they were able to engage in entrepreneurship, and the strength of their intention to pursue entrepreneurship as the next stage in their careers. In addition, the survey included two aspects of positive and negative displacement, how urgently the Dounreay employees feel they need to find new work and whether they have found an idea for starting a business. The central question raised by this research is whether there are displacement effects that affect intention above and beyond what would be expected given the levels of the desirability and feasibility of entrepreneurship, and that is answered by estimating and comparing the goodness of fit of two
models, one with and one without assuming that a need for new work and having ideas for starting a venture have an independent relationship with intention.

Macfarlane (2007) began discussions with the managers of the Dounreay facility responsible for closing the facility and taking steps to minimise the negative economic impact on the Dounreay workforce, and the local economy. As part of a discussion to support the offering of an entrepreneurship short course, Dounreay management agreed to support a survey of the workforce to gather information that would be useful in the course design. A questionnaire that had been used repeatedly in the assessment of university-based entrepreneurship (Cooper and Lucas 2007a, Cooper and Lucas 2007b) in the past served both the need for educational assessment and research, and was adapted to the Dounreay circumstances. Both a paper and on-line versions were prepared because, while many employees had ready access to the on-line questionnaire, employees and contractors working in the trades often did not. The survey was then discussed with management and with Dounreay union representatives to obtain their support for the survey effort, and the on-line survey was made available at the same time a paper version was also distributed.

Both the Dounreay management and the union representatives encouraged participation in the survey, and a total of 384 individuals, constituting 22% of the workforce, completed the survey. There was a strong bias in the response in that 81.7% of the respondents were men, and 41.1% were scientists, engineers or technicians. In addition, 7.0% were in information technology roles, so almost half the respondents had some form of technical skill. The other better represented occupations were in management (12.5%) and administration (10.2%). Because the survey was intended to inform the subsequent offering of an entrepreneurship short course, the call asking individuals to take the survey suggested that it would be of value to those interested in becoming entrepreneurs, and it appears that a substantial number of women and others with an aversion to the idea of entrepreneurship generally did not take part in the survey. While not a representative sample, the participants nonetheless varied greatly from those quite interested in starting their own companies to those who were quite sceptical.

Measurement
Six variables are included in the models presented here. The exogenous variables, those that have no prior predictors in the model, are based on the number of entrepreneurial role models enjoyed by the respondents and their perceived need to find new work. Three variables measure in turn entrepreneurial desirability, self-efficacy and intention, concepts central to the Intention Model in the entrepreneurship literature. The sixth measure determines whether the respondent already has an idea for starting a company.

Role Models and Vicarious Learning. Role models may be thought of two ways. The sociological literature tends to stress role models as individuals that a subject models on, when how positively they feel about the role model is a central consideration. If they have a strong positive attitude towards a role model, the subject will take on the normative behaviour and attitudes as their own (Gibson 2004, Decker 1986, Mantz and Sims 1981). One might expect that subjects who see role models they like or admire who are entrepreneurs would then see entrepreneurship as being more desirable. A different view is found in the self-efficacy literature, most notably in the writing of Bandura (1986, 1997). Here the subject is seen as engaged in vicarious learning, watching others to learn about task difficulty, how one can perform those tasks and in the process become more capable of performing those tasks themselves. The distinguishing difference is that vicarious learning would not seem to depend on whether one has a positive or negative orientation towards those role models, a key assumption in this analysis, and its primary effect would be expected to be heightened self-efficacy rather than desirability.

This work chose to approach role models as a potential source of vicarious learning, focusing on the number and type of individuals the respondent had known that had owned their own businesses. The survey asked in turn if either of the respondent’s parents, another relative or close family friend, a current friend or neighbour, and a colleague had ever owned their own business (see Table 1). The Role Model variable was created by adding the number of these types of people who had been business owners and were potential source of vicarious learning, leading to a finding that only 25.0% did not know anyone in these categories who had run a
business, while 26.0% knew one such role model. The wealth of opportunities these individuals had to learn about performing business operations is found in the 21.8% who knew two role models, and 27.2% who knew three or more.

Table 1: Frequency and Summed Number of Role Models

<table>
<thead>
<tr>
<th>Type of role model</th>
<th>Number of role models who had run their own business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father</td>
<td>29.7%</td>
</tr>
<tr>
<td>Mother</td>
<td>20.3%</td>
</tr>
<tr>
<td>Other close relative</td>
<td>38.0%</td>
</tr>
<tr>
<td>Friend or neighbour</td>
<td>44.8%</td>
</tr>
<tr>
<td>Spouse</td>
<td>16.7%</td>
</tr>
<tr>
<td>Colleague at Dounreay</td>
<td>19.8%</td>
</tr>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>One</td>
</tr>
<tr>
<td></td>
<td>Two</td>
</tr>
<tr>
<td></td>
<td>Three</td>
</tr>
<tr>
<td></td>
<td>Four or more</td>
</tr>
</tbody>
</table>

Perceived Need for New Work. This variable is a measure of the felt urgency of the Dounreay employees to find a new source of financial support. It relies on two Likert format items asking for agreement or disagreement to statements that “I need to find a new job as soon as possible,” and “I will stay on in my current job as long as I can”. The second item is reverse coded, and the two items summed to create a scale with a higher score indicating a greater need. The scale has a Cronbach’s alpha coefficient of .679.

Having ideas. The individual was asked to agree or disagree in a Likert format with the statement, “I have one or two ideas which could form the basis for starting a new venture.” This item was in the same battery as the items determining the individual’s need for new work, and factor analysis showed that they load on different components.

Self-efficacy and Intention. Measures of entrepreneurial desirability, self-efficacy and intention were taken from assessment research on entrepreneurship education of studies where they have used for a number of years to assess separate programmes in the UK and Australia, and as well as to evaluate their comparative effectiveness (Cooper and Lucas 2007a, Cooper and Lucas 2007b). The measure of entrepreneurial intention is based on three Likert agree/disagree statements that ask about the current saliency of entrepreneurship (“I often think about ideas and ways to start a business”), about a long term commitment to start a business at some point (“At least once I will have to try and start my own company”), and a more active and current view of the present (“If I see an opportunity to start a company, I’ll take it”). In past studies the Cronbach’s alpha coefficient has clustered around .8, and here the results follow that pattern with an alpha of .812.

The self-efficacy measure similarly used Cooper and Lucas (2007a and 2007b) was originally adopted from the work of Betz and Hackett (1981) and Lent and Hackett (1987) on career self-efficacy, where one asks if one knows what is needed to become an entrepreneur, and whether the respondent could become an entrepreneur if he or she choses. For the Dounreay employees, the scales performed fairly well with acceptable scale reliability for Entrepreneurial Self-efficacy (alpha = .773).

Measuring what is desirable. The items for the measurement of entrepreneurial desirability departs from the practice of asking about the attractiveness of being an entrepreneur in a generic sense (e.g. Krueger 1994), leaving the interpretation of what constitutes entrepreneurship to the respondent. Instead a measure used in the past and for the present study asks about the attractiveness (from Very attractive to Very unattractive) of a variety of work positions including both those that are clearly entrepreneurial, and other roles such as being self-employed without having any employees, and being employed in an established firm. In a past study of undergraduates in entrepreneurship Cooper and Lucas (2007) report using factor analysis to identify a desirability scale that consists of three types of entrepreneurship that all involved starting a successful company, and did not include self-employment or being an employee of a start-up.
Factor analysis of the Dounreay data found a different result, with being an employee loading on a component with the other items (see Table 2.) It appears that a higher urgency of needing new work broadens the forms of entrepreneurial engagement that are attractive, leading to a four item scale with a Cronbach’s alpha = .758.

Table 2: Factor analysis of attractiveness of types of positions for Desirability scale.

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being a part owner and member of a management team in a small new company.</td>
<td>.797</td>
<td></td>
</tr>
<tr>
<td>Being employed in a newly started venture.</td>
<td>.722</td>
<td></td>
</tr>
<tr>
<td>Holding full ownership of a small and stable business that employs others.</td>
<td>.708</td>
<td></td>
</tr>
<tr>
<td>Being on a small company management team working to grow and then sell the business.</td>
<td>.704</td>
<td></td>
</tr>
<tr>
<td>Being self-employed with no full time employees.</td>
<td>.526</td>
<td></td>
</tr>
<tr>
<td>Being the founder or co-founder of a not for profit organisation.</td>
<td>.467</td>
<td></td>
</tr>
<tr>
<td>Retiring early on an attractive pension.</td>
<td>.814</td>
<td></td>
</tr>
<tr>
<td>Working part-time.</td>
<td>.669</td>
<td></td>
</tr>
<tr>
<td>Being employed in a large established company.</td>
<td>.477</td>
<td></td>
</tr>
</tbody>
</table>

Rotation Method: Varimax with Kaiser Normalization. Explained variance is 46.3%. First four items on the first component with loadings of .6 or higher are used to form a scale of desirable entrepreneurship. Cronbach’s alpha for the italicised items = .758.

The Entrepreneurial Intention Model Assuming Mediated Displacement

The analysis begins by using Figure 2 to set up and test these variables in a structural equation model. Role Models and Need for Work are used as exogenous variables predicting Self-efficacy, Have Ideas and Desirability, as postulated. The first model to be tested assumes that the effects of Role Models, Need for New Work, and Have Ideas are all mediated by Self-efficacy and Desirability so that only Self-efficacy and Desirability have significant paths to Intention.

The model is run several times with reversals to the direction of the paths for the relationships between the three paths Self-efficacy to Desirability, Self-efficacy to Have Ideas, and Desirability to Have Ideas with no change in the goodness of fit statistics used to evaluate the model. The results are noted below by a bi-directional arrow (↔) to indicate that the results are not dependent of a specification of the direction of influence, which may be reciprocal.

Looking at the results for Role Models, Self-efficacy, Desirability and Intention, the relationships here are what would be expected. The number of role models the individual has predicts a higher level of self-efficacy (beta = .321, p < .001). Self-efficacy predicts intention (beta = .423, p < .001). While it was excluded from the present calculation, when the model is estimated again with the path of Role Models → Intention included, the independent effect of Role Models is found to be trivial (beta = -.007, n.s.). Despite the quite strong predictive power of Role Models, it is mediated by Self-efficacy and the deletion of the path from Role Models to Intention is warranted. In other analysis of the Dounreay data (Lucas et al. 2008), age and gender are also found to be mediated. In this regard, Dounreay employees are not different from other populations that have been studied, with Self-efficacy and Desirability having a substantial predictive effect on Intention (R² = 39.5%), while mediating past experience and attitudes.

As one might expect, a Need for New Work predicts an increase in the Desirability of entrepreneurship (beta = .178), but the fact that Need for New Work also relates to Self-efficacy (beta = .178) and Have Ideas (beta = .178, with p < .001 for all three relationships).

Table 3: Intention Model with Mediated Displacement Factors

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Predicted variable</th>
<th>B Standard error</th>
<th>beta</th>
<th>C.R.</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGSE 2009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1150</td>
</tr>
</tbody>
</table>

1150
Role models → Self-efficacy .578 .086 .321 6.730 .001
Role models → Desirability .040 .027 .072 1.480 .139
Role models → Have Ideas .060 .044 .065 1.379 .168
Need for New Work → Self-efficacy .448 .120 .178 3.724 .001
Need for New Work → Desirability .131 .038 .167 3.480 .001
Need for New Work → Have Ideas .249 .059 .192 4.236 .001
Self-efficacy ↔ Have Ideas .205 .025 .400 8.363 .001
Self-efficacy ↔ Desirability .065 .017 .210 3.918 .001
Have Ideas ↔ Desirability .117 .032 .193 3.666 .001
Mediated model assumes only Self-efficacy and Desirability influence Intention directly
Self-efficacy → Intention .170 .017 .423 9.916 .001
Desirability → Intention .436 .055 .336 7.862 .001

←→ indicates a path with a direction of influence that yields the same results regardless of directional assumptions. Standardised regression coefficients that are statistically significant are italicised. The goodness of fit statistics for this model are Chi Square = 81.513, df = 3, Chi square/df = 27.1, p = .000, RMSEA = .261 and PCFI = .171. In a separate test, the path between Role models and Intention is inserted, and the beta = -.007, n.s., confirming it is mediated by Self-efficacy and Desirability and the Role Model to Intention path may be excluded.

Self-efficacy is related quite highly with Have Ideas (beta = .400, p < .001), and Have Ideas is related (beta = .193, p < .001) with Desirability. When evaluating a set of relationships as a formal model, it is not sufficient to consider each relationship separately. Structural equation modelling or a related method of path analysis allows one to ask the larger question if the paths included in the model adequately fit the actual relationships among all variables. When goodness of fit statistics are calculated for the model represented in Table 3, consisting of the first set of six hypothesised relationships with no provision for the direct paths from the two displacement variables Needs New Work and Have Ideas to Intention, it fails all statistical tests for goodness of fit. Where a well fitting model has a low Chi square value and a non-significant probability (Kline 2005), the result for this model is Chi square = 81.513, p < .001. A commonly used measure RMSEA takes into account the parsimony of the model and is

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<th>Standard error</th>
<th>beta</th>
<th>C.R.</th>
<th>p</th>
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</thead>
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<tr>
<td>Role models → Self-efficacy</td>
<td>.578</td>
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<td>.321</td>
<td>6.730</td>
<td>.001</td>
<td></td>
</tr>
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<td>.040</td>
<td>.027</td>
<td>.072</td>
<td>1.480</td>
<td>.139</td>
<td></td>
</tr>
<tr>
<td>Role models → Have Ideas</td>
<td>.060</td>
<td>.044</td>
<td>.065</td>
<td>1.379</td>
<td>.168</td>
<td></td>
</tr>
<tr>
<td>Need for New Work → Self-efficacy</td>
<td>.448</td>
<td>.120</td>
<td>.178</td>
<td>3.724</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Need for New Work → Desirability</td>
<td>.132</td>
<td>.038</td>
<td>.167</td>
<td>3.480</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Need for New Work → Have Ideas</td>
<td>.249</td>
<td>.059</td>
<td>.192</td>
<td>4.236</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Self-efficacy ↔ Have Ideas</td>
<td>.205</td>
<td>.025</td>
<td>.400</td>
<td>8.363</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Self-efficacy ↔ Desirability</td>
<td>.065</td>
<td>.017</td>
<td>.210</td>
<td>3.918</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Have Ideas ↔ Desirability</td>
<td>.117</td>
<td>.032</td>
<td>.193</td>
<td>3.666</td>
<td>.168</td>
<td></td>
</tr>
</tbody>
</table>

←→ indicates a path with a direction of influence that is ambiguous, but when tested, the model with either direction results in the same goodness of fit. Standardised regression coefficients that are statistically significant are bolded. Chi Square = 0.051, df = 1, p = .821, RMSEA = .000. The R² for the explained variance in Intention is 39.5%.

AGSE 2009
1151
widely used, and that statistic also suggests rejecting this model. While the rule of thumb is the RMSEA should be less than \( .05 \) (Kline 2005), here the RMSEA is \( .261 \).

Testing for direct displacement effects
The question then becomes whether the addition of the two paths from the displacement variables create a better fitting model. If there are consequential direct effects, it serves as evidence that unlike generally mediated factors such as social norms, attitudes and experiences regarding entrepreneurship, displacement increases intention directly, and one can evaluate that effect by the corresponding standardized regression coefficients and goodness of fit of the two models.

In the new model (Table 4), the first specified relationships are identical and the results are the same as those in Table 3. The focus is on two new relationships, Need for New Work and Have Ideas predicting Intention, and the changes to be found in the strength of the relationships of both Self-efficacy and Desirability with Intention. One first sees that at the same time the Need for New Work again shows an effect of Desirability (beta = \( .167 \)), it has almost as strong a separate and direct effect on Intention (beta = \( .130 \), p < .001). The relationship between Self-efficacy and Intention drops sharply (from beta = \( .423 \) to beta = \( .271 \), p < .001), and the dominant predictor of Intention is now Having Ideas, with a direct relationship of beta = \( .343 \) (p < .001). These results are shown graphically in Figure 3.

![Figure 3: Intention Model with Role Models and Need for New Work](image)

The superiority of the second model that sees displacement as a direct influence on intention is evidenced by the increase in explained variance (R²) from 39.5% to 51.1%. A test of the improvement of moving from the effect of just Self-efficacy and Desirability to using all four variables is conducted by stepwise regression (see Table 5) that shows that the increase is statistically significant (R² change of 11.5%, F change = 44.6, df = 2, 379, p < .001).

The addition of the two direct paths for the displacement variables has an even more striking effect on the goodness of fit of the over-all model. Where the baseline model is not a fit at all, the model that assumes there are direct displacement effects performs quite well. As noted above, a fit is indicated by a very small Chi square and a higher probability, and this model has a Chi square of \( .051 \) (df = 1, p = .821). Where the RMSEA without the two additional paths is .252, much higher than the rule of thumb that it should be lower than .05, the RMSEA for the second model is .000.
Table 5: Stepwise regression test of change in explained variance of Displacement

<table>
<thead>
<tr>
<th>Predicting Entrepreneurial Intent</th>
<th>b</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Mediated Intention Model</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>.503</td>
<td>.184</td>
<td>2.736</td>
<td>.007</td>
<td></td>
</tr>
<tr>
<td>Desirability</td>
<td>.436</td>
<td>.056</td>
<td>.336</td>
<td>7.841</td>
<td>.000</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.170</td>
<td>.017</td>
<td>.423</td>
<td>9.890</td>
<td>.000</td>
</tr>
<tr>
<td>R = .629, R² = 39.5%; df = 2, 381; F = 124.5; p &lt; .001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Intention Model with Direct Displacement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>.196</td>
<td>.172</td>
<td>1.134</td>
<td>.257</td>
<td></td>
</tr>
<tr>
<td>Desirability</td>
<td>.300</td>
<td>.052</td>
<td>.231</td>
<td>5.733</td>
<td>.000</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.109</td>
<td>.017</td>
<td>.271</td>
<td>6.462</td>
<td>.000</td>
</tr>
<tr>
<td>Have Ideas</td>
<td>.269</td>
<td>.033</td>
<td>.343</td>
<td>8.089</td>
<td>.000</td>
</tr>
<tr>
<td>Need for New Work</td>
<td>.132</td>
<td>.039</td>
<td>.130</td>
<td>3.381</td>
<td>.001</td>
</tr>
<tr>
<td>R = .715, R² = 51.5%; df = 4, 3379; F = 98.8; p &lt; .001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R² change = 11.5%; F change = 44.6; df = 2, 379; p &lt; .001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The goodness of fit statistics, the significance of the improvement in the explained variance, and the size of the standardised regression coefficients together suggest that displacement factors have a direct and major effect on entrepreneurial intention above and beyond the effect they also have on desirability and feasibility.

**DISCUSSION**

The principal conclusion is that positive and negative displacement factors play a major role in the development of nascent entrepreneurship among adults well into their careers. While it may be that there are precipitating events that have a sharp and discontinuous effect on intention (Shapero and Sokol 1982, Krueger and Brazeal 1994), it appears that negative displacement is taking the form at Dounreay of steadily increasing pressures to find work in the face of the inevitable closing of the facility. Perceptions of that inevitability and its impact vary by age and other factors (Lucas et al 2008), but for those that feel some urgency, it has a direct effect on their level of intention.

The results for the effects of having ideas for a business are even more important, if only because in the model here it has a stronger effect on intention than either desirability or self-efficacy.

If the contention is that there are displacement events that cause a step-level change in entrepreneurial intention, having arrived at an idea worth taking forward would have to be considered a focus of future study. Once an idea is in hand, the tasks that one needs to undertake become much clearer, allowing the nascent entrepreneur to focus on exactly what is being desired and what tasks need to be performed. Knowing what is to be done has the probable result that the relationship between self-efficacy will be higher, as self-efficacy is adjusted up or down now that the tasks that will be required. The steps the entrepreneur needs to take become more tangible, and can be more readily acted upon. While it is possible that the results in this paper may be limited to necessity-driven contexts, the study of whether an individual has an idea, their confidence in the idea and whether they know how to pursue a specific idea would seem a promising line of enquiry.

Another result of some consequence is that the Dounreay employees have a striking number of role models that have a particularly strong effect on higher levels of self-efficacy. The theoretical literature on self-efficacy (Bandura 1986, 1997) stresses that it is primarily direct performance of tasks that enhances self-efficacy. Yet the results here would suggest that vicarious learning from others plays a more important role in entrepreneurial self-efficacy than one might have thought, making Shapero and Sokol’s (1982) discussion of this point worth revisiting.
On a more methodological note, the strong relationship found between self-efficacy and desirability is interesting in large measure because that path is generally not shown in previous intention models. This result is consistent with the proposition offered that self-efficacy is the predictor variable because one does not desire something too strongly unless it is obtainable, but this model only supports the magnitude of the relationship, not the direction. If one were to reverse the direction of this path, and rerun the model, it yields exactly the same result. It is also possible to reverse the path directions for the relationships between both self-efficacy and desirability with having ideas for starting a company. There are methods to use structural equations to test for the direction of influence, including the possibility of reciprocal causation, and exploring the direction of influence would provide a deeper understanding on some of the psychological processes involved in the development of nascent entrepreneurship.

The second major finding is that the Intention Model is significantly influenced by the crystallising effect of having an idea for a start-up, increasing both Self-efficacy and Desirability, a result that is consistent with the traditional view of intention development, but again some modification is suggested: the empowerment of having an idea seems to have a separate and direct effect on entrepreneurial intention.

A last point is that one should not see these results as weakening the case of the simpler Intention Model, where Desirability and Self-efficacy generally mediate other factors. This prior work has been based largely on the study of younger adults in early stages of nascent entrepreneurship, and it could be argued that there is a period of early intention formation not influenced by displacement factors. It may be only when the individual has a firm idea for starting a company, and/or other displacement conditions occur, that a second stage of intention development occurs.

CONCLUSION

The Dounreay environment provides an unusual opportunity to study the effects of both negative (need for new work) and positive (having found an idea for a company) displacement forces that influence entrepreneurial intention. This paper revisits the entrepreneurial intention model and the role of displacement suggested in Shapero (1975), Shapero and Sokol (1982), Krueger (1993) and Krueger and Brazeal (1994). It examines the growing urgency for new work felt by the employees and contractors being put at risk by the decommissioning of the Dounreay Nuclear Power Facility, expecting it to be a steadily growing pressure displacing individuals from their current career paths. At the same time, for those who have taken to heart the Dounreay recommendation of the Dounreay Site Restoration organisation that they should pursue starting a new business, there appears to be step-level change in their intention and their behavior once they have found a useful idea for what that company should be.

The results are consistent with the view that there are displacement factors that cause potential entrepreneurs to have stronger intention, and start taking active steps to start companies. While these forces can be gradually growing pressures and emergent confidence in ideas, and therefore do not take the form of precipitating events mentioned in the literature, they do suggest that displacement plays a major role. When studying individuals who are older and have already started their careers, research on nascent entrepreneurship should take into consideration points of career transition, set-backs at work and other times when one might expect that negative displacement to occur. At all ages and career stages, one might be alert to the empowering effects of having an idea that strengthens intentions and triggers behaviours to turn the idea into a reality.

REFERENCES


