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Understanding, differentiating, and measuring opportunity recognition and opportunity exploitation

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Abstract

Purpose – Opportunity recognition and opportunity exploitation are two central concepts in the entrepreneurial process. However, there is a lack of both a clear specification of the content domains of the constructs and valid and reliable multi-item scales for their measurement. The paper aims to discuss these issues.

Design/methodology/approach – This paper first reveals existing issues around the definitions and measures relating to the concepts, then defines their content domains, and also proposes scale items to measure the concepts. Four samples are used to develop the measurement instruments.

Findings – Two scales are suggested, one to measure opportunity recognition, and other to measure opportunity exploitation. The scales demonstrate reliability and construct, discriminant, and nomological validity.

Originality/value – The resulting instruments provide tools for research and practice that could prove valuable when examining the antecedents and consequences of both opportunity recognition and opportunity exploitation.

Keywords Recognition, Opportunity, Exploitation, Measurement scales

Paper type Research paper

Introduction

Entrepreneurial opportunities and the distinction between opportunity recognition and opportunity exploitation have been extensively discussed in the entrepreneurship literature for quite some time. While the importance of understanding opportunity recognition and opportunity exploitation (and also the need to identify their antecedents and consequences) is undisputed in the literature, the progress of the field has slowed, owing to: the lack of consensus on the content domains of opportunity recognition and opportunity exploitation, and a lack of agreement on the measurement of the two constructs. Recent works on research design, scale development, and measurement practice in entrepreneurship (Slavec and Drnovsek, 2012; McDonald *et al.*, 2015) show that such issues are not limited to the research on opportunity recognition and opportunity exploitation; nevertheless, such central concepts should be clearly defined and measures made available to enable progress in the field.

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The current research identifies the conceptual and methodological issues surrounding opportunity recognition and opportunity exploitation, and informs the academic discourse by specifying the content domains of opportunity recognition and opportunity exploitation, that is, the body of knowledge related to these concepts covering their subject area as completely as possible to allow developing reliable, valid, and distinct measures. The resulting instruments will be valuable to researchers and practitioners investigating the relationship between opportunity recognition and opportunity exploitation and, in turn, their relationships with other variables. As such, they could advance research examining the antecedents and consequences of both concepts.

This study therefore contributes to the literature on opportunity research in three important ways. First, researchers clearly define both constructs in a rigorous way, thus informing the theoretical discussion around opportunity recognition and opportunity exploitation. Second, rigorously developed measurement scales for both constructs will allow future research to investigate these constructs in a plethora of different research settings. Finally, the analysis contributes to the research stream of entrepreneurial opportunities by painting an elaborate nomological net around these constructs illustrating important relationships with other key constructs in opportunity research.

Issues in understanding and measuring opportunity recognition and opportunity exploitation

Entrepreneurial opportunities are generally understood as "situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production" (Shane and Venkataraman, 2000, p. 220). As such, they imply "the chance to meet a market need (or interest or want) through a creative combination of resources to deliver superior value" (Ardichvili *et al.*, 2003, p. 108). Such situations may appear as unmet customer and market needs, or under-employed resources and are likely to emerge when change occurs, new information becomes available, or the marketplace is subject to incongruence. Shane and Venkataraman (2000) argue that "although the discovery of an opportunity is a necessary condition for entrepreneurship, it is not sufficient. Subsequent to the discovery of an opportunity, a potential entrepreneur must decide to exploit the opportunity" (p. 222). Following this logic, the current research treats opportunity recognition and opportunity exploitation as distinct (Jarvis, 2016), but often consecutive, steps in the entrepreneurial process.

Nevertheless, a closer look at the burgeoning number of studies on opportunity recognition and opportunity exploitation reveals serious issues impeding improved understanding. Many studies do not, for example, specify the content domain of the concepts, and make implicit assumptions on what constitutes opportunity recognition or opportunity exploitation (Kuratko *et al.*, 2005a); whereas other studies reveal mismatches between theoretically derived dimensions and their measurement (e.g. Sambasivan *et al.*, 2009). Many studies use single-item measures that are often purely numerical (e.g. Singh *et al.*, 1999); while other studies add alternative (albeit sometimes related) ideas such as the innovativeness of the opportunity (e.g. Tumasjan and Braun, 2012). Some studies develop ad hoc scales without reporting rigorous reliability and validity testing (e.g. Nicolaou *et al.*, 2009). Many studies that use opportunity recognition or opportunity exploitation as the independent or dependent variable refer to existing measures to justify their measures, but are not clear on how the measures employed were altered or extended (e.g. Ozgen and Baron, 2007; Sambasivan *et al.*, 2009).

Marked differences exist among the measures between the content domains of the constructs. For example, some studies indicate opportunity recognition is about innovative opportunities (e.g. Tumasjan and Braun, 2012), while others exclude that dimension (e.g. Nicolaou *et al.*, 2009; Shane and Nicolaou, 2015). Another example is that some studies

differentiate between opportunity-recognition perceptions and opportunity-recognition behaviors (e.g. Gibbs, 2009), whereas others see both aspects as part of the same construct (e.g. Nicolaou *et al.*, 2009). The vast majority of studies exclusively examine either opportunity recognition or opportunity exploitation, but do not address how the two concepts are interrelated, which may be related to the observation that literature has not provided a universally applicable distinct pair of measures for opportunity recognition and opportunity exploitation. Shane and Nicolaou (2015) provide an initial step by capturing a tendency to recognize entrepreneurial opportunities and a tendency to start businesses in the same study. However, they link both concepts to creativity as an anteceding factor and abstain from discussing their direct relationship.

Overall, the lack of distinct measures for opportunity recognition and opportunity exploitation hinders obtaining an understanding of the similarities and differences concerning their antecedents and consequences. There is a lack of consensus over: the definition and understanding of the content domains of opportunity recognition and opportunity exploitation, and the measurement of the two constructs. Both issues hinder efforts to build a solid knowledge base on opportunity recognition and opportunity exploitation, one that would include aspects such as identifying the distinct antecedents of both constructs. The current study addresses both issues.

Understanding opportunity recognition and opportunity exploitation

Procedure and sample

DeVellis (2003) suggested that the development of a new measure must start with a clear definition of the construct and thus a specification of that construct's content domain. In order to clarify the assumptions relating to the meanings of the constructs, this study uses as its starting point the initial theoretical considerations and then surveys researchers familiar with the domain of entrepreneurship on which activities involve opportunity recognition and which involve opportunity exploitation. This approach is in line with suggestions in the literature calling for topic experts to be involved in the process of scale development (DeVellis, 2003; Slavec and Drnovsek, 2012).

Accordingly, the research team developed an online survey and sampled 347 academics with a professional interest in entrepreneurship research who subscribed to the Entrepreneurship-PhD mailing list[1]. Opportunity recognition and opportunity exploitation were considered to be behavioral, activity-based concepts that take place on the individual level. Thus, apart from some descriptive elements, the survey predominantly comprised two open questions:

(1) Please share your ideas about opportunity recognition. Assuming somebody perceives an entrepreneurial opportunity, be it a (potential) entrepreneur or corporate entrepreneur, what kind of activities would be involved?

(2) If somebody has perceived an entrepreneurial opportunity and decided to act upon it, this step is usually called opportunity exploitation. Assuming somebody acts upon a perceived entrepreneurial opportunity, be it a (potential) entrepreneur or corporate entrepreneur, what kind of activities would be involved?

Overall, 106 usable responses had been received, commensurate with a response rate of 30.55 percent. Viewed alongside the high response rate, the non-significant results of a wave analysis comparing early respondents to late respondents on the demographic variables (Armstrong and Overton, 1977) indicate non-response bias should not be an issue. Academics from 37 countries provided responses, with researchers from Germany, the UK, and the USA dominating the first 40 percent of the sample. With an average professional interest in entrepreneurship of 7.29 years (SD = 5.16), the sample can be

considered quite experienced. The respondents ranged from doctoral students (37.7 percent) to researchers at the professorial level (44.3 percent). As more than 84 percent of the respondents had at least 2.13 years of experience with entrepreneurship, and given the very basic questions in the questionnaire, which can be considered to address issues central to entrepreneurship, these numbers suggest the respondents were sufficiently familiar with the topic to provide meaningful answers.

Analysis and results

Specific activities related to opportunity recognition and opportunity exploitation were compiled by two researchers in the author team from the qualitative data. MAXQDA 10, a comprehensive software program for qualitative data analysis, was utilized to analyze the responses to the two open questions in an open-coding process based on the initial theoretical considerations. Content analysis assisted the identification of 12 key activities: six activities reflecting opportunity recognition and six reflecting opportunity exploitation. The categories were retested by two researchers not on the author team, who assigned the respondents' statements back to their respective categories again. The inter-rater reliability per category was measured with Cohen's κ (Landis and Koch, 1977) and can be considered substantial (average κ opportunity recognition: 0.613; average κ opportunity exploitation: 0.695). This result supports the assumption that the categories developed were appropriate.

The six activities defining opportunity recognition in general were: being alert, searching, gathering information, communicating, problem solving, and evaluating. These activities included (but were not limited to) cognitive processes involved in the entrepreneurial process (Gregoire *et al.*, 2010; Correia Santos *et al.*, 2015) and did share the quality of being well established in theoretical opportunity-related research. First, being alert refers to creative and strategic thinking, which allows opportunity recognition (Shane and Nicolaou, 2015) or having an open mind in terms of business opportunities (Tang *et al.*, 2012). Second, searching is defined through the regular scanning of the environment and a systematic search for business opportunities, or by doing market research to identify business opportunities (Fiet, 2002). Third, gathering information activities for instance relate to acquiring knowledge and information on business opportunities or to looking for new ideas on products or services (Ozgen and Baron, 2007). Fourth, communicating refers to talking to friends, colleagues, potential customers, mentors, entrepreneurs, or experts about business opportunities (Dimov, 2007a). Fifth, addressing customer needs refers to the generation of a business opportunity based on a perceived customer problem (Ardichvili *et al.*, 2003). Sixth, evaluating involves assessing the feasibility of business ideas or whether proposed opportunities fit individual experience, skills, capabilities, and knowledge (McMullen and Shepherd, 2006). As a consequence, a preliminary definition of the construct can be proposed; however, this definition might be modified in the scale-development process (Slavec and Drnovsek, 2012):

> *Preliminary Definition 1.* Opportunity recognition is characterized by being alert to potential business opportunities, actively searching for and gathering information about them, communicating on them, addressing customer needs, and evaluating the viability of such potential entrepreneurial activities.

The six activities recorded as defining opportunity exploitation in general were: developing a product or service, acquiring human resources, planning the business, understanding customers and the market, gathering resources, and setting up the organization. Just as with opportunity recognition, the activities identified perfectly aligned with (but were not limited to) existing concepts of nascent entrepreneurial activities and engaging in the startup and new venture development process. First, developing a product or service involves, for instance, the innovative destruction of current products or services, prototyping and testing,

and reacting to feedback (Gartner *et al.*, 2010). Second, acquiring human resources is related to searching for or hiring employees, and assembling an entrepreneurial team to pursue business opportunities (McGee *et al.*, 2009). Third, planning the business is based on the business model and the written business plan (Shane and Delmar, 2004). Fourth, understanding customers and the market is defined through discussing and identifying customer needs, the evaluation of the acceptance of products or services by customers, and the comparison between the business opportunity and existing solutions (Foss *et al.*, 2013). Fifth, gathering resources refers to building up a network, approaching investors or the government, and raising money from family and friends (Haynie *et al.*, 2009; Lassalle and McElwee, 2016). Sixth, setting up the organization is defined through the setting up of formal structures (Gartner *et al.*, 2010). The identified activities led to the following preliminary definition:

Preliminary Definition 2. Opportunity exploitation is characterized by developing a product or service based on a perceived entrepreneurial opportunity, acquiring appropriate human resources, planning the organization, understanding customers and the market, gathering financial resources, and setting up the organization.

Item generation and content validity evaluation

Procedure and sample

Based on Preliminary Definitions 1 and 2, and the twelve activities they encapsulate, researchers developed a large initial item pool of candidates for inclusion in the scales (DeVellis, 2003). Following suggestions in the literature, items were generated by conducting a literature review and examining existing scales related to the constructs (Churchill, 1979), as well as by obtaining expert input (DeVellis, 2003; Slavec and Drnovsek, 2012). This resulted in 81 item candidates.

To evaluate content validity, the research team conducted another online survey and sampled 348 additional active subscribers of the Entrepreneurship-phd mailing list who had not participated in the first stage of the scale development. This step was intended to establish the content validity of each proposed item (DeVellis, 2003), that is, to clarify the extent to which experts on entrepreneurship would relate each single item to the two constructs under investigation. Participants were asked to evaluate each of the 81 items with respect to the question of whether a specific item would reflect opportunity recognition or opportunity exploitation. To help them do so they were presented with a five-point scale anchored with clearly describes opportunity recognition (1) and clearly describes opportunity exploitation (5). The research team received 95 usable responses with similar demographics and quality criteria as in the first sample.

Analysis and results

Participants placed each of the initial 81 items somewhere on the continuum between opportunity recognition and opportunity exploitation. Inter-rater reliability was excellent: the average intra-class correlation of the ratings is 0.979 indicating a very high (Cicchetti, 1994) consistency among the raters. Figure 1 shows the aggregated results for the 12 key activities by visualizing the mean value of the activity (captured by the average of the items belonging to that particular activity) and its respective standard deviation. Clearly, the activities can be ordered into a sequence from searching for an entrepreneurial opportunity at one end of the continuum toward gathering resources as the most unambiguous activity related to opportunity exploitation at the other. This sequence is in line with other conceptualizations of entrepreneurial activities (e.g. McGee *et al.*, 2009) and provides a

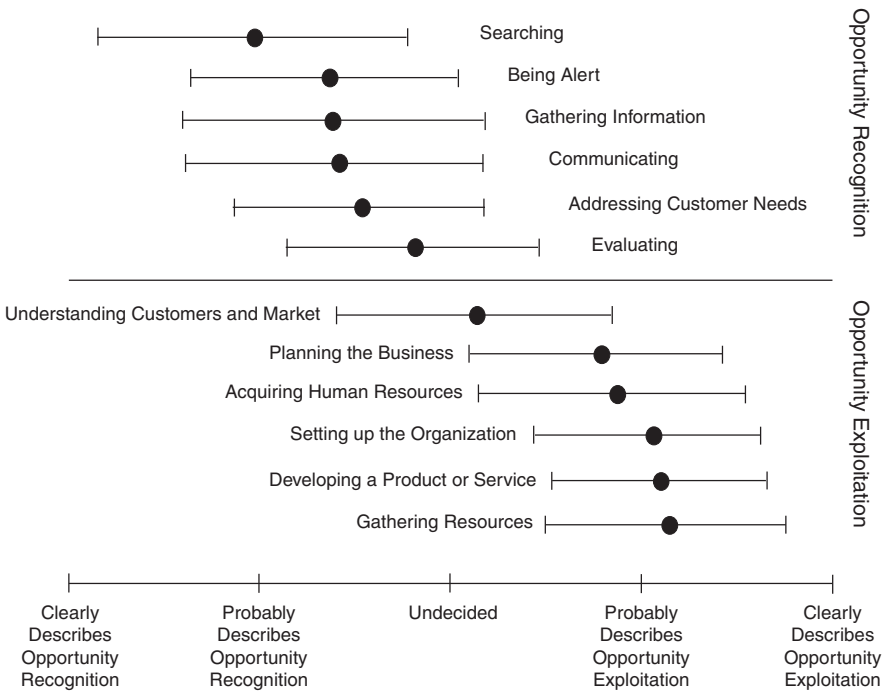

Figure 1. Aggregated results for the 12 initially detected activities describing opportunity recognition and opportunity exploitation (visualized as the activity's mean relative to the other activities' means and the respective standard deviations)

description of the entrepreneurial process with rising commitment to the exploitation of a perceived entrepreneurial opportunity.

On the item level, only items with a mean lower than two were selected as potential opportunity recognition items; that is, items that were on average classified as "probably describes opportunity recognition". In contrast, only items with a mean higher than four were selected as potential opportunity exploitation items, that is, those items beyond the threshold of "probably describes opportunity exploitation." The use of mean values to identify fitting and discriminant items is established in the literature (Carlson *et al.*, 2000) and perfectly aligns with this study's objective of providing distinct measures for opportunity recognition and opportunity exploitation. In summary, the expert evaluation found that 11 items described opportunity recognition and 13 items described opportunity exploitation. These items are analyzed in greater detail in the next step.

Item refinement based on construct validity

Procedure and sample

In this section, the 24 items retained are examined for construct validity in order to develop the final scales. For this, researchers chose to collect data first in a corporate entrepreneurship setting before retesting the scales in an entrepreneurship setting. This was done for several reasons. First, and in line with recent scale-development practice (Tang *et al.*, 2012), it seemed wise to use data from different sources in the scale-development process. Second, literature suggests that not only researchers, but also practitioners should participate in the scale-development process (Slavec and Drnovsek, 2012). Third, the rationale behind preferring a corporate entrepreneurship sample to a more entrepreneurial sample in the item-refinement step of the scale-development process relates to the generalizability requirement (Tang *et al.*, 2012). From one perspective, in order to create

sufficient variance, the goal was to select a population of which a substantial part could be expected to be recognizers of entrepreneurial opportunities and another substantial part could be expected to be non-recognizers of the same (Kuratko *et al.*, 2005b). By contrast, researchers were aware the final scales should be applicable in both the pure entrepreneurship and the corporate entrepreneurship context, for instance to assess the relationship between organizational design and opportunity recognition and opportunity exploitation in established firms.

An online questionnaire including the 24 items was administered in English to 595 executive managers working in firms included on the Dow Jones Global Titans 50 Index. Executive managers are known to play an important role in the success of corporate entrepreneurship initiatives (Hornsby *et al.*, 2009). Recruitment was conducted through an international professional online network boasting more than 11 million members at the time of data collection. Its comprehensive nature allowed the identification of network members employed in Global Titans 50 firms proportionate to the coverage of the firm in the index.

We received usable responses from 101 executive managers, commensurate with a satisfying response rate of 16.97 percent. In a wave analysis (Armstrong and Overton, 1977) comparing all 24 items in addition to the key descriptive variables in the data did not return a single significant difference. Again, non-response bias should therefore not be considered an issue. Respondents were on average 38.96 years old (SD = 7.53) and had 14.75 years of work experience (SD = 7.97). The number of male respondents substantially exceeded that of female respondents (84.2 percent male respondents vs 15.8 percent female respondents). The sample consists of well-educated people, with only 13.9 percent of respondents having no formal degree.

Analysis and results

The reliability and validity of the measurement were established by examining the psychometric properties of the constructs, in particular, by employing exploratory and confirmatory factor analyses alongside other correlational analyses. Following Anderson and Gerbing's (1988) approach, which has been utilized for scale-development purposes by Shepherd *et al.* (2009) among others, all items were assigned to their respective factors in the confirmatory step of the analysis. The final scales were identified following several iterations refining the model.

First, all items loaded on their respective factor, and no item had to be eliminated because of substantial cross-loadings. However, two items from the proposed opportunity-exploitation scale had to be dropped because their loading was too low on the respective construct (< 0.5). Moreover, 13 items were eliminated as either their measurement errors were substantially correlated or their wording seemed theoretically redundant. The final scales consisted of five items on the opportunity recognition scale and four items on the opportunity exploitation scale.

The coefficient α for the opportunity recognition scale was 0.87, which is adequate (Nunnally, 1978). Corrected item-total correlations ranged from 0.62 to 0.76, averaging 0.70, which is also adequate. In this sample, the minimum value of opportunity recognition was 1 and the maximum value 7 (measured on a seven-point Likert scale), with a mean value of 4.95 (SD = 1.32), which is a good coverage. The coefficient α for the opportunity exploitation scale is 0.79, which is adequate too. Corrected item-total correlations range from 0.55 to 0.68, averaging 0.61, which is also adequate. In this sample, the minimum value of opportunity exploitation is 1, the maximum is 6.75, with a mean value of 2.75 (SD = 1.38), which represents good coverage. The mean values suggest that the scales adequately reflect the corporate setting.

In the CFA, as suggested in the literature, multiple indices were used to assess fit (Beauducel and Wittmann, 2005). We included the χ^2-test, the comparative fit index (CFI), and

the standardized root mean residual (SRMR). Given established standards (Hair *et al.*, 2013; Hu and Bentler, 1999), the fit of the assumed two-factor solution was quite satisfactory (χ^2/df = 1.27, CFI = 0.98, SRMR = 0.05) and significantly better than a model in which the opportunity recognition and exploitation items were collapsed into one factor (χ^2/df = 4.44, CFI = 0.74, SRMR = 0.14; χ^2 difference = 86.76, df difference = 1, $p < 0.001$), indicating reliability and validity. For both scales, average variance extracted (opportunity recognition: AVE = 0.58; opportunity evaluation: AVE = 0.50) reached the critical value of 0.5 (Hair *et al.*, 2013), indicating that an adequate amount of variance is captured by the constructs and suggesting adequate convergence. The square roots of the variance extracted for each measure are greater than the correlation, suggesting that opportunity recognition and opportunity exploitation are distinct. Furthermore, to statistically assess the mode (reflective vs formative) of the relevant scales, the research team ran a confirmatory tetrad analysis (CTA) (Gudergan *et al.*, 2008) implemented in the software package SmartPLS 3 (Ringle *et al.*, 2014). The CTA returned insignificant results for every single tetrad, which suggests that both measurement models are reflective. Table I presents the final scales.

Retest and convergent, nomological, and discriminant validity

Next, researchers conducted a retest of the validity of the newly developed scales, using a different sample with an entrepreneurial background to enhance the credibility of the measures and to support generalizability across samples (Tang *et al.*, 2012). The process continued with an evaluation of the convergent, discriminant, and nomological validity of the newly developed scales.

Retest

Procedure and sample. The scales for opportunity recognition and opportunity exploitation were included in a survey targeting UK entrepreneurs. To identify those entrepreneurs, the

	Corrected item-total correlation	Loadings in CFA	Loadings in EFA (factor OR)	Loadings in EFA (factor OE)
Opportunity recognition (OR)[a] ($\alpha = 0.87$; *Sample mean* $= 4.95$; *SD* $= 1.32$)				
1 I am always alert to business opportunities	0.62	0.66	0.64	0.05
2 I research potential markets to identify business opportunities	0.69	0.76	0.72	0.08
3 I search systematically for business opportunities	0.73	0.79	0.74	0.16
4 I look for information about new ideas on products or services	0.68	0.73	0.79	0.12
5 I regularly scan the environment for business opportunities	0.76	0.84	0.89	−0.12
Opportunity exploitation (OE)[a] ($\alpha = 0.79$; *Sample mean* $= 2.75$; *SD* $= 1.38$)				
1 I have set up an organization to pursue a business opportunity I perceived	0.57	0.66	−0.08	0.69
2 Based on a business opportunity I perceived, I have developed a new market	0.63	0.71	0.03	0.71
3 I have put together an entrepreneurial team to pursue a business opportunity I perceived	0.68	0.80	0.03	0.79
4 I have approached investors (e.g. business angels or venture capitalists) to acquire funding for a business opportunity	0.55	0.63	0.00	0.62

Notes: [a]Measured on a seven-point Likert scale. CFA: χ^2/df = 1.27; CFI = 0.98; SRMR = 0.05

Table I. Opportunity recognition (OR) and opportunity exploitation (OE): final scales

research team chose an internet panel provider, which selected survey participants based on its master data. The respondents' status as either entrepreneur or self-employed was verified in the first step of the survey, and the data collection phase produced 243 usable responses. On average, the respondents had been entrepreneurs for 11.96 years (SD = 11.27) and had founded 1.67 ventures (SD = 1.65) during their career. Hence, the team concluded the sample had sufficient experience to report on entrepreneurial phenomena.

Analysis and results. The current research conducts CFA using AMOS to assess the pair of scales. A two-factor model with one factor representing opportunity recognition and one factor representing opportunity exploitation performed well (χ^2/df = 3.76, CFI = 0.94, SRMR = 0.05). The two-factor model performed significantly better (χ^2 difference = 99.75, df difference = 1, $p < 0.001$) than a one-factor model, in which both scales were collapsed into one factor (χ^2/df = 7.32, CFI = 0.87, SRMR = 0.09), underlining discriminant validity between opportunity recognition and opportunity exploitation in the retest as well.

Convergent validity

This section demonstrates that the scales for opportunity recognition and opportunity exploitation relate to other measures they would theoretically be expected to relate to. However, this relatedness should not be of a magnitude that would signal construct redundancy.

Entrepreneurial alertness. Kirzner (1973) established that alertness is an ability central to the entrepreneurial process because it makes individuals aware of changes, shifts, and opportunities overlooked by others (Tang *et al.*, 2012). Drawing on Kirzner's work and more recent developments by McMullen and Shepherd (2006) and Tang *et al.* (2012) defined entrepreneurial alertness as consisting of three dimensions: scanning and searching for information, connecting previously disparate information, and evaluating the existence of profitable business opportunities. Entrepreneurial alertness involves not only gathering, associating, and evaluating information on business opportunities, but is also linked to action (and as such with the willingness to act on the business opportunity (Tang *et al.*, 2012; McMullen and Shepherd, 2006). Hence, it can be assumed that entrepreneurial alertness is strongly related to both opportunity recognition and opportunity exploitation. However, the relationship of entrepreneurial alertness with opportunity recognition will be stronger than with opportunity exploitation, as the activities of gathering, associating, and evaluating information are more proximate to recognizing an opportunity than to exploiting it:

H1. Opportunity recognition will demonstrate a stronger positive correlation with the entrepreneurial alertness dimensions than opportunity exploitation.

Nascent entrepreneurial behaviors. Following Aldrich and Martinez (2001), nascent entrepreneurial behaviors are meant to result in a feasible business startup. Such behaviors encompass growing and assembling various resources, including knowledge, which can be combined into an organization (Gartner *et al.*, 2010). Nascent entrepreneurial behaviors thus involve both acquiring knowledge about the opportunities available to start a business and combining resources to pursue an opportunity once identified (McGee *et al.*, 2009), and can therefore be assumed to have strong relationships with both opportunity recognition and opportunity exploitation; however, the relationship will be stronger with opportunity exploitation than with opportunity recognition, as the behaviors involve a strong tendency to act on a particular opportunity rather than identifying one or a variety of opportunities worth pursuing:

H2. Opportunity exploitation will demonstrate a stronger positive correlation with nascent entrepreneurial behaviors than opportunity recognition.

Procedure, sample, and measures. Testing *H1* and *H2* was conducted using the sample detailed in the section on retesting. Entrepreneurial alertness dimensions were captured

with the scales developed by Tang *et al.* (2012). With respect to nascent entrepreneurial activities, a variety of lists of behaviors have been developed in the extant literature (see Gartner *et al.*, 2010, for an overview). Researchers decided to apply the six behaviors depicted by McGee *et al.* (2009) as they concisely reflect the activities involved in creating a feasible business.

Analysis and results. This study applies a structural equation modeling approach using AMOS to test its hypotheses. With respect to *H1*, researchers ran a series of confirmatory factor analyses and a correlation analysis. Researchers began with a one-factor model in which all the items of opportunity recognition, opportunity exploitation, and the three alertness dimensions loaded on the same factor. Results show that the model did not fit the data ($\chi^2/\text{df} = 6.17$, CFI = 0.74, SRMR = 0.08). Next, a five-factor model with one factor representing each of the variables was estimated. Model fit improved significantly ($\chi^2/\text{df} = 3.23$, CFI = 0.89, SRMR = 0.08, χ^2 difference = 647.81, df difference = 10, $p < 0.001$). For computing correlations, AMOS was employed to benefit from incorporating the different weights of the items of a given construct. Opportunity recognition correlated with alert scanning and search at 0.78 ($p < 0.001$), with alert association and connections at 0.72 ($p < 0.001$), and with evaluation and judgment at 0.71 ($p < 0.001$). Opportunity exploitation correlated with alert scanning and search at 0.59 ($p < 0.001$), with alert association and connections at 0.64 ($p < 0.001$), and with evaluation and judgment at 0.61 ($p < 0.001$). As expected, opportunity recognition correlated more strongly with all entrepreneurial alertness dimensions than did opportunity exploitation. Supporting *H1*, a comparison of correlation coefficients revealed that the positive correlations between opportunity recognition and the entrepreneurial alertness dimensions are significantly greater ($p < 0.05$) than the respective correlations with opportunity exploitation. Given the stronger relationship between entrepreneurial alertness and opportunity recognition than with opportunity exploitation, researchers excluded the opportunity exploitation factor from additional testing. Again, the multi-factor model outperformed the model in which the entrepreneurial alertness dimensions and opportunity recognition were collapsed into one factor. This also holds true for any pairwise combination of a single alertness dimension and opportunity recognition. Viewed as a whole, the results reveal that opportunity recognition, opportunity exploitation, and entrepreneurial alertness are strongly related but distinct concepts.

With respect to *H2*, researchers ran a series of confirmatory factor analyses, and a correlation analysis. Researchers began with a one-factor model in which all the items of the three scales (opportunity recognition, opportunity exploitation, and nascent entrepreneurial activities) loaded on the same factor. Results show that the model did not fit the data ($\chi^2/\text{df} = 5.16$, CFI = 0.77, SRMR = 0.10). Next, a three-factor model with one factor representing each of the variables was estimated. Model fit improved significantly ($\chi^2/\text{df} = 2.73$, CFI = 0.91, SRMR = 0.06, χ^2 difference = 226.44, df difference = 3, $p < 0.001$). Supporting *H2*, opportunity exploitation (0.67; $p < 0.001$) correlated more strongly ($p < 0.05$) with nascent entrepreneurial behaviors than opportunity recognition did (0.56; $p < 0.001$). Given the stronger relationship between nascent entrepreneurial activities and opportunity exploitation than between nascent entrepreneurial activities and opportunity recognition, the opportunity recognition factor was excluded from additional testing. Again, the multi-factor model outperformed the model in which nascent entrepreneurial activities and opportunity exploitation were collapsed into one factor. Taken together, convergent validity of the scales was established, as the results show that opportunity recognition, opportunity exploitation, and nascent entrepreneurial activities were closely related but distinct concepts.

Nomological validity

Any construct validation process involves demonstrating nomological validity. To do so, researchers assessed how opportunity recognition and opportunity exploitation behave within systems of related constructs (i.e. nomological nets) and examined whether the constructs measured by the proposed scales related to other established constructs in the literature as expected. Specifically, researchers established nomological validity by applying two samples and multiple models. The chosen antecedent and consequent variables are grounded in extant theories of human capital, innovation, and organizational emergence and revealed the similarity and differences in the links between opportunity recognition and opportunity exploitation with other variables.

Risk taking. Following the prospect theory logic presented by Baron (2004), (corporate) entrepreneurs can be risk takers who aim not to overlook an opportunity; that is, they tend to recognize opportunities. Furthermore, they act upon opportunities to avoid losses they would incur if they were not to act; that is, they tend to exploit opportunities. This theory is also about a tendency to overemphasize small probabilities. Following Baron (2004), this may be the "factor which leads nascent entrepreneurs to risk their time, fortunes, and careers in starting new ventures" (p. 226), underscoring the link between risk taking and opportunity exploitation. Indirect support is provided by the work of Sambasivan *et al.* (2009), who found that quality skills that involve having a risk-taking attitude are positively related to opportunity-recognition skills:

H3. Risk taking is positively associated with opportunity recognition and directly and indirectly associated with opportunity exploitation.

Originality. The concept of originality is strongly associated with the concepts of innovativeness and creativity (Miron-Spektor *et al.*, 2011). In order to identify business opportunities (corporate) entrepreneurs have to be able to find innovative solutions to customer problems (Baron, 2006; Hansen *et al.*, 2011). The literature includes many theoretical assertions linking creativity and opportunity recognition (Dimov, 2007b). In line with these theoretical assertions, Gielnik *et al.* (2012) found that creativity is positively associated with opportunity recognition. Dess and Lumpkin (2005) theoretically link innovativeness to the exploration of business opportunities, but not to their exploitation. Only recently, Shane and Nicolaou (2015) have found that creative personalities exhibit a greater tendency to recognize business opportunities. They also found that creative personalities are more likely to start a new business. However, given these contradictory assertions, and because these studies do not directly address originality and opportunity exploitation, they cannot be interpreted as clear indications of a relationship between these variables. As there are neither theoretical assertions nor empirical findings directly and indisputably linking originality and opportunity exploitation, researchers do not hypothesize this direct relationship:

H4. Originality is positively associated with opportunity recognition and indirectly positively associated with opportunity exploitation.

Prior knowledge. Prior knowledge refers to the information individuals hold on a subject matter and it increases the likelihood of a person successfully recognizing and exploiting a business opportunity (Shepherd and DeTienne, 2005). Enhanced prior knowledge affects an individual's capability to find, associate, and decide on new information and allows that person to recognize and capitalize on certain business opportunities that others do not (Venkataraman, 1997):

H5. Prior knowledge is positively associated with opportunity recognition and opportunity exploitation.

Positive affect. Positive affect refers to feelings or emotions reflecting a pleasurable engagement with the environment, such as enthusiasm, excitement, or joy (Watson *et al.*, 1988). Positive affect influences how information is retained and processed and has been found to play a role in alertness and opportunity recognition, and its consequences, such as the acquisition of essential financial and human resources, or innovation (Baron, 2008):

H6. Positive affect is positively associated with opportunity recognition and opportunity exploitation.

Innovation. From a process perspective, innovation usually refers to the identification and utilization of business opportunities to create new products, services, or markets. Innovation begins with the selection of an idea identified as a business opportunity and ends with the commercialization of the invention (Amabile *et al.*, 1996). The act of exploiting an opportunity should lead to an innovation, whether truly radical or less so. Tang *et al.* (2012) have found recently that entrepreneurial alertness, a concept strongly related to opportunity recognition, is linked to innovations, which suggests that opportunity recognition is an antecedent of innovations as well:

H7. Both opportunity recognition and opportunity exploitation are positively associated with innovations.

Number of businesses started. Starting a new business can be considered a central objective of entrepreneurship (Gartner, 1988). Consequently, engaging in the entrepreneurial process and succeeding in the recognition and exploitation of a business opportunity should ultimately lead to starting a new business in the end. We assume that people with the capability to recognize and exploit opportunities matched with a willingness to do so, will found more new businesses than people lacking such capability and willingness:

H8. Both opportunity recognition and opportunity exploitation are positively associated with the number of businesses started.

Procedure, samples, and measures. The testing of *H3* and *H4* relied on the sample detailed in the section on item refinement, while testing *H5-H8* relied on the sample detailed in the section on retesting. In both samples, opportunity recognition and opportunity exploitation were captured using the items developed in this study. To measure originality, corresponding items of the Kirton-Adoption-Innovation inventory were included in the analysis (Kirton, 1976; Kuckertz and Wagner, 2010). Items taken from the instrumental risk-taking scale of Zaleskiewicz (2001) were adopted to provide an entrepreneurship-relevant measure of attitude to risk. Prior knowledge was measured in the same way as described by Tang *et al.* (2012), with three items following Shane (2000). The ten positive-affect items of the Positive and Negative Affect Schedule (PANAS) captured positive affect (Watson *et al.*, 1988), and the three-item scale of Subramaniam and Youndt (2005) captured innovation. The number of businesses started is a single item taken from Nicolaou *et al.* (2009).

Analysis and results. This study applied a structural equation modeling approach using AMOS to test its hypotheses. With respect to *H3*, researchers conducted a mediation analysis. The fit of the first model linking risk taking to opportunity recognition, and both variables to opportunity exploitation was quite adequate ($\chi^2/\mathrm{df} = 1.69$, $\mathrm{CFI} = 0.92$, $\mathrm{SRMR} = 0.08$). As had been anticipated, risk-taking propensity associated with opportunity recognition (0.45, $p < 0.001$) and explained a considerable amount of the variance in the variable ($R^2 = 0.20$). Equally, as hypothesized, risk-taking propensity (0.26, $p < 0.05$) and opportunity recognition (0.32, $p < 0.01$) were associated with opportunity exploitation, and explained 24 percent of the variance in opportunity exploitation. The indirect effect of risk taking on opportunity exploitation via opportunity recognition was

also significant (0.14, $p < 0.05$), which is in line with the theoretical model linking risk taking to both opportunity recognition and opportunity exploitation.

A further mediation analysis was conducted to test *H4*. The fit of the second model linking originality to opportunity recognition, and both variables to opportunity exploitation was quite adequate ($\chi^2/df = 1.55$, CFI = 0.93, SRMR = 0.08). As anticipated, an individual's originality associated with opportunity recognition (0.30, $p < 0.01$) and explained a considerable proportion of the variance in this variable ($R^2 = 0.09$). Again as assumed, originality did not affect opportunity exploitation (0.051, $p > 0.10$), whereas opportunity recognition was significantly associated with opportunity exploitation (0.42, $p < 0.01$), explaining 19 percent of the variance in opportunity exploitation. The indirect effect of originality on opportunity exploitation via opportunity recognition was significant (0.13, $p < 0.05$) as might be expected given the line of argumentation presented in establishing *H4*.

With respect to *H5-H8*, researchers created a more complex model that included multiple antecedents (positive affect, prior knowledge) and consequences (innovation, number of businesses started) of opportunity recognition and opportunity exploitation. As expected, the model fit the data well ($\chi^2/df = 2.01$, CFI = 0.93, SRMR = 0.06).

The results obtained from evaluating the hypotheses indicate that prior knowledge is positively linked to both opportunity recognition (0.32, $p < 0.001$) and opportunity exploitation (0.20, $p < 0.01$), thus supporting *H5*. *H6* was also supported, because positive affect was positively associated with both opportunity recognition (0.40, $p < 0.001$) and opportunity exploitation (0.25, $p < 0.01$). Notably, prior knowledge and positive affect are significantly correlated (0.53, $p < 0.001$). Together, both antecedents explained a significant amount of variance in opportunity recognition ($R^2 = 0.40$). As expected, opportunity recognition was associated with opportunity exploitation (0.42, $p < 0.001$). Prior knowledge, positive affect, and opportunity recognition explained 55 percent of the variance in opportunity exploitation. Moving to the consequences of opportunity recognition and exploitation, *H7* was supported in that both opportunity recognition (0.29, $p < 0.001$) and opportunity exploitation (0.52, $p < 0.001$) were associated with innovation. Both variables explained 55 percent of the variance in innovation. *H8* was partially supported as 10 percent of the variance in numbers of businesses started can be explained by opportunity recognition and opportunity exploitation. As expected, opportunity exploitation was linked to the number of business started (0.35, $p < 0.001$). Contrary to the proposed hypothesis, however, no direct link was found between opportunity recognition and the number of businesses started (–0.08, $p > 0.10$). An analysis of the indirect association between opportunity recognition and number of businesses started via opportunity exploitation did however reveal a significant indirect effect (0.15, $p < 0.01$). Consequently, not finding a direct effect should not be taken as an indication that opportunity recognition is irrelevant in explaining the number of businesses started. Rather, it indicates that recognized opportunities have to be exploited to culminate in new businesses. Taking the results of the examination of *H3-H8* together, one can conclude that how opportunity recognition and opportunity exploitation behave in a nomological net is in line with extant theory, indicating nomological validity.

Discriminant validity

The preceding sections already provided an initial indication of discriminant validity, because both opportunity recognition and opportunity exploitation had insignificant relationships with other variables and because those non-significant relationships are in line with theoretical considerations. The following section offers additional evidence of discriminant validity by reporting the results of testing the relationships to variables, which theoretically should not be present for either opportunity recognition or opportunity exploitation.

Negative affect. Contrary to positive affect, which has been found to relate both to opportunity recognition and to opportunity exploitation, negative affect should relate to neither. Negative affect refers to feelings or emotions that reflect an unpleasant engagement with the environment, such as one resulting in distress, upset, or fear (Watson *et al.*, 1988). Negative affect narrows an individual's perceptual field and reduces the readiness to notice and to act upon external events (Baron, 2008). It has also been linked to behaviors aiming to reduce risks (Iyengar *et al.*, 2006), which prevent engagement in a risky activity such as opportunity exploitation. In line with recent research (Tang *et al.*, 2012), researchers do not assume a positive or negative association with entrepreneurial behavior such as opportunity recognition or exploitation, because "existing evidence concerning the effects of this variable does not provide a strong and consistent empirical foundation on which to base theoretical predictions" (Baron and Tang, 2011, p. 539):

H9. Both opportunity recognition and opportunity exploitation will demonstrate discriminant validity with negative affect.

Time spent self-employed. Contrary to the number of businesses started, this study argues that the time an individual has spent being self-employed will not relate to either opportunity recognition or opportunity exploitation. An individual with the ability and willingness to recognize or exploit opportunities, or to combine both is more likely to become self-employed. It follows that after a period of time such an individual is likely to identify a new opportunity and may decide to pursue it. An individual with a weak or moderate tendency to recognize and exploit opportunities may stay in their current employment area. In both cases, the time in self-employment would be same, precluding a clear correlation:

H10. Both opportunity recognition and opportunity exploitation will demonstrate discriminant validity with the length of time an individual has been self-employed.

Procedure, samples, and measures. *H9* and *H10* were tested using the sample detailed in the section on retesting. Opportunity recognition and opportunity exploitation were captured using the items developed in this study. The ten negative-affect items of the PANAS were used to capture negative affect (Watson *et al.*, 1988). Time spent self-employed is a single item taken from Nicolaou *et al.* (2009).

Analysis and results. A structural equation modeling approach using AMOS was adopted to test the hypotheses. With respect to *H9*, negative affect correlated significantly with neither opportunity recognition (0.04; $p > 0.10$) nor opportunity exploitation (–0.08; $p > 0.10$) as hypothesized. With respect to *H10*, the results showed that time spent self-employed did not correlate significantly with either opportunity recognition (-0.08; $p > 0.10$) or opportunity exploitation (0.03; $p > 0.10$). Taken together, the results help to establish discriminant validity. Figure 2 summarizes all relationships discussed and illustrates the elaborate nomological net of opportunity recognition and opportunity exploitation.

Conclusion

The current research underlines the importance of differentiating between opportunity recognition and opportunity exploitation. Its aims were to develop definitions for both constructs and also to generate distinct measures to capture them. The findings reveal that opportunity recognition and opportunity exploitation are in fact multifaceted activities. Initially, research identified six activities defining opportunity recognition and six defining opportunity exploitation, and accordingly initial definitions of both constructs were adopted. Given the results obtained in the item-positioning task, the need for distinct

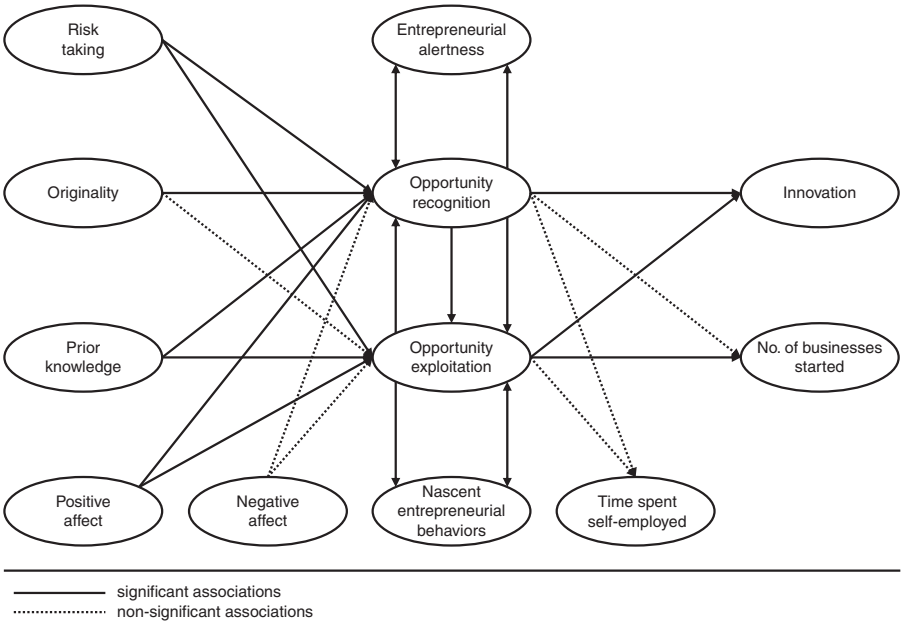

Figure 2.
Opportunity recognition and opportunity exploitation: nomological net

definitions and measures, and the validity testing of the proposed scales, it seemed wise to refine those preliminary definitions. Those refinements are presented below:

Final Definition 1. Opportunity recognition is characterized by being alert to potential business opportunities, actively searching for them, and gathering information about new ideas on products or services.

Final Definition 2. Opportunity exploitation is characterized by developing a product or service based on a perceived entrepreneurial opportunity, acquiring appropriate human resources, gathering financial resources, and setting up the organization.

Redefining constructs after further process steps is commonplace in understanding constructs and developing appropriate measures (Slavec and Drnovsek, 2012). It is important that any new definitions are in line with the basic idea of what the construct should represent and are also reconcilable with theory; and the new definitions above meet both criteria. As can be seen in Figure 1, the evaluation activity was not positioned as describing opportunity recognition, but rather somewhere in the indeterminate zone between opportunity recognition and opportunity exploitation. This insight is in line with basic assumptions on the entrepreneurial process. While Shane and Venkataraman (2000) orientate their article around opportunity recognition and opportunity exploitation by investigating the question "why, when, and how some people and not others discover and exploit […] opportunities" (p. 218), other researchers such as Haynie *et al.* (2009) suggest opportunity evaluation is an additional process, distinct from opportunity recognition and opportunity exploitation. As a distinct process, it should be separated both theoretically and empirically from opportunity recognition and opportunity exploitation. Recent experimental research by Welpe *et al.* (2012) expressly examining antecedents of opportunity evaluation and opportunity exploitation underscores the need to distinguish evaluation from recognition and exploitation. In addition, the communication and customer-understanding

activities that were part of the initial definitions have been removed. In Figure 1, both activities were placed close together and around the indeterminate area.

In addition, the communicating and customer-understanding activities that were part of the initial definitions were subsequently removed because they proved vague. From a conceptual point of view, it is hard to see relevance of opportunity recognition in communicating with other people when it is not aimed at gathering information on the opportunity (which is a different activity). Communicating may help (corporate) entrepreneurs to evaluate the viability of an idea, but that would be a different construct. Additionally, some people tend not to talk about their ideas for fear of others stealing them. In the same manner, understanding customers is, at least to some extent, included in the activities of gathering information and developing a product or service. From a statistical point of view, communicating and customer-understanding activities were placed closely together and around the indeterminate area (Figure 1). Their inclusion would lead to both theoretical and empirical issues around the discriminant validity of the two concepts.

Finally, researchers excluded planning the business activity as it turned out not necessarily to be a purely exploitation activity. Additionally, literature and entrepreneurial practice tell us that a business plan is not necessarily part of founding a business. This is also in line with existing literature on effectuation (Sarasvathy, 2001) and more specifically on lean startups (Ries, 2011). This study's proposed definitions might improve the understanding of the ideas behind opportunity recognition and opportunity exploitation, and guide future research, and in doing so advance the understanding of the phenomenon of entrepreneurial opportunity.

The scales resulting from the rigorous scale-development procedure reflect the definitions and account for the need to be clearly able to separate opportunity recognition from opportunity exploitation. One limitation of the suggested measurement scales might be that they were developed in different grammatical tenses. Research (Spector *et al.*, 1997) has shown that this might result in separate factors even if the underlying concept is of unidimensional nature. However, given that researchers were able to separate both constructs not only theoretically, but also to empirically establish nomological, convergent, and discriminant validity, the risk of separate factors resulting seems negligible.

Second, with the growing interest in concepts such as effectuation (Sarasvathy, 2001) or lean startups (Ries, 2011) one might conclude that it would not make any sense to differentiate between opportunity recognition and opportunity exploitation. However, although iterative approaches to the entrepreneurial process such as the effectual logic or the lean start-up approach carry great explanatory power, differentiating between opportunity recognition and opportunity exploitation (Shane and Venkataraman, 2000) is still a valid description of the entrepreneurial process, even if one argues that the exploitation of an opportunity is followed by another sequence of recognizing an opportunity based on new information, and exploiting this new or adjusted opportunity.

With respect to implications for entrepreneurship theory, the differentiation between opportunity recognition and opportunity exploitation enables a far more fine-grained understanding and examination of the entrepreneurial process. The nomological and discriminant analysis established that opportunity recognition and opportunity exploitation have both shared and different antecedents and consequences. Future research seeking to explain the opportunity phenomenon in more detail might take these findings as a motivation to study further antecedents and consequences of both constructs. Comparable research has been conducted by Rauch and Frese (2007), who differentiate between the antecedents of business creation and business success. Moreover, this study's approach is predominantly in line with the discovery theory of opportunity-related research (Alvarez and Barney, 2007; Korsgaard, 2013), and hence future research should consider a similar approach to develop constructs related to entrepreneurial opportunity-creation theory.

Note

1. Entrepreneurship-PhD is an international mailing list for researchers in the field of entrepreneurship. Currently, there are approximately 780 subscribers to the list, ranging from doctoral students to full professors.

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