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Creativity, proactivity, and foresight

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ABSTRACT

This study addresses how foresight interventions can translate creativity into proactive behavior and, in this sense, foster anticipatory strategic management. We develop a theoretical model, linking creativity and proactivity with known discrete individual foresight cognitive styles, namely "Reactor", "Tester", "Adapter", and "Framer", but also add a new "Actor" dimension. The theoretical model is tested by analyzing quantitative data from 172 students attending two scenario-building workshops. Our SEM model allows us to formulate three conclusions. First, creativity is not directly linked to proactivity without considering individual foresight cognitive styles. Second, we confirm the presence of four components of foresight as discrete foresight cognitive styles but also demonstrate the importance of a fifth component, the "Actor". Third, it is only through the "Tester", "Adapter", and "Actor" components that creative energy most significantly aids proactivity. This means that creativity most significantly aids proactivity when individuals are either able to experiment with alternative courses of action or change the conditions for how their respective futures may unfold. We contribute to the foresight literature by demonstrating how foresight, as a process of intervention, can foster discrete foresight cognitive styles at the individual level and moderate relationships between creativity and proactivity.

1. Introduction

The emerging problems that today's organizations need to address are increasingly more intertwined, complex, and multifaceted. These new difficulties require organizations to employ creative problem-solving (e.g., Reiter-Palmon and Illies, 2004; Mazzucchelli et al., 2019) but also to demonstrate commitment and persistence, in order to implement these creative solutions. Hence, the environmental turbulence that organizations increasingly face requires proactivity in how they respond to changes in their environments. The ability to develop and implement strategies based on anticipation of the future states of the environment, i.e., based on foresight rather than reacting to experienced changes in the environment, can in itself constitute an important element of sustained competitive advantage (Ahuja et al., 2005; Raimond, 1996; Vecchiato, 2015). Therefore, this study is driven by the idea of exploring the links between creativity, foresight and proactivity.

Addressing this link is a matter of both strategic management and human resource management at both the organizational and the individual levels. On the one hand, strategic management should address how to create organizational processes that can aid managers to improve their individual but also their collective creativity, proactivity, and foresight abilities. On the other hand, this is also a human resource management issue, as educational and training institutions should educate and train future employees, enabling them to act proactively, to acquire the appropriate foresight skills and the abilities for creative problem handling.

Although the foresight literature has addressed the links between individual and organizational levels, issues of strategic management and human resource management are still not adequately integrated into the foresight knowledge base (see e.g., Balarezo and Nielsen, 2017; Kamprath and Meitzner, 2015). Earlier studies in the foresight literature document positive effects of scenario planning, describing how, as an intervention, it develops individual leadership capabilities, as well as capacities that can function as a strategic tool for HR development (McWhorter et al., 2008; Rhisiart et al., 2015). Moreover, foresight also improves learning abilities in times of great uncertainty (Cederquist and Goluke, 2016). However, there remains a lack of studies on the purposive evaluation of outcomes attributable to scenario-planning interventions (Balarezo and Nielsen, 2017; Chermack et al., 2006) identifying the mechanisms and contextual factors contributing to those outcomes (Frith and Tapinos, 2020; Jefferson, 2020). From the perspective of this study, studies demonstrating how foresight as an intervention can mediate relationships between creativity and proactivity are also in short supply. This is a problem–especially for educators

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and trainers, who need to know when and how foresight methods can actually aid creativity and proactivity.

To address this research gap, this study explores how scenario-building exercises, arranged according to foresight methods, foster the particular individual abilities necessary for anticipatory strategic management. Anticipatory strategic management is expected to include elements such as proactivity, creative problem-solving, and foresight competences/styles (Lesca and Lesca, 2014; Syrett and Devine, 2012; Fergnani, 2020; Gordon et al., 2020) although relationships between them are not well articulated and studied. In this study, we build a theoretical model, which is then tested empirically in explaining the links between creativity, foresight cognitive styles, and proactivity. In this model, proactivity refers to the ability of an individual to shape their own future, i.e., a personal disposition toward proactive behavior in terms of a relatively stable tendency to affect environmental change (Bateman and Crant, 1993). In its turn, creative problem-solving is a mode of intuitive, rather than logically structured and rules-guided, problem-solving based on a nonhabitual thought related to judgments, decisions, or actions (Jabri, 1991). Creativity takes place when one combines hitherto unrelated and perhaps conflicting information in a new way (Ko and Butler, 2006). In our study, we understand foresight methods as organized processes of intervention that produce scenarios that are anticipations of the future, produced as "narrative visualizations", allowing the formulation of future strategies. Such organized interventions could be operationalized via scenario-planning workshops, which are sometimes even referred to as the "institutionalization of imagination" (Scoblic, 2020). As regards discrete foresight styles, these are distinct foresight approaches that describe how individuals relate themselves to the future (van der Laan and Erwee, 2012), i.e., discrete levels of cognitive styles to envision the possible futures and react to these emergent insights–by either ignoring or adapting to them or by actively changing the conditions that determine the path into the future. Based on these considerations, the research question we would like to answer is:

"How does foresight translate creativity into proactive behavior"?

The paper investigates a scenario-building workshop that is a part of an international master's degree course. This scenario-building workshop is based on an intuitive logic school scenario method, developed by Shell. It included exercises requiring a combination of both creativity and foresight approaches. We report the results of an analysis of quantitative data collected from students attending two scenario-building workshops organized at a university in 2017 and 2018. Investigating survey data from 172 students enabled us to report results on how creativity, proactivity, and foresight interrelate.

First, our findings demonstrate that students' creativity is not directly linked to proactivity as part of foresight without considering what individual cognitive foresight styles are involved. Possessing a creative problem-solving ability does not necessarily aid proactivity, unless some particular students' foresight abilities are stimulated in the setting of a foresight intervention/workshop. Second, we find that creativity aids almost all discrete foresight components among students except for the "Reactor" component of the van der Laan and Erwee (2012) foresight cognitive style inventory, which is not related to creativity. Third, creative energy leads to proactivity only through certain foresight styles. Our investigation reveals that foresight abilities, such as those of the "Actor", "Tester", and "Adapter" styles, aid proactivity, while those of the "Framer" or "Reactor" styles do not. We also find that a new proposed foresight style, "Actor", emerges from the intervention as among the most significant aid to proactivity. This means that creativity significantly aids proactivity in a scenario workshop setting when individuals are able to either experiment with alternative courses of action or change the conditions for how the respective futures may unfold.

This paper contributes to the literature on foresight abilities (Amsteus, 2008), by proposing a significant new dimension of the foresight cognitive style inventory that links creativity to proactivity: an "Actor" dimension – an additional discrete foresight cognitive style (van der Laan and Erwee, 2012). A further contribution lies in our demonstration of how the design of the foresight process enhances learning processes that aid the development of new abilities, such as creativity and proactivity, identifying the mechanisms and contextual factors contributing to those outcomes (McWhorter et al., 2008; Cederquist and Goluke, 2016; Frith and Tapinos, 2020; Jefferson, 2020). We conclude the paper with insights into how our findings further support the application of foresight methods in education, leading to more creative but also more proactive students–future employees and managers.

The rest of the paper is structured as follows. The next section describes relevant theoretical insights on which the study is based, concluding with our research model. The method section describes the measures used, detailing our population, the analytical modeling, and the details of the scenario-planning intervention in our case. It is followed by a section presenting the empirical results of our study. Finally, we analyze our results and draw conclusions, as well as pointing out the theoretical and practical implications of the study.

2. Theoretical framework and research model

In this section, we provide a review of our concepts, such as foresight, creativity, and proactivity, and elaborate on links between those elements.

2.1. Foresight as an intervention – an intuitive logic school and the shell method

In order to answer our main research question *"How does foresight translate creativity into proactive behavior?"*, this section first presents a review of the literature on foresight as an intervention. Foresight, as a process, and scenarios, as its product, are a part of prospective story telling (Schoemaker, 1993). The aim of making scenarios is to create a plausible set of pictures of what alternative futures might look like (Amer et al., 2013; Slaughter, 1996). This then allows the creation of new strategic narratives, enabling new thinking and innovations in organizations (Kaplan and Orlikowski, 2013). Scenarios would typically produce a possible image of the future "… that depicts possible courses of actions and consequences of such to make organisations and individuals resilient against future shocks" (Schatzmann et al., 2013, p. 2).

As an organizational process of intervention, foresight is supposed to enhance the formulation of strategic choices, as it helps organization members to envision possible futures and therefore extend their boundaries of perceptions. Herman Kahn, the founding father of scenario analysis, defined scenario planning as "… a set of hypothetical events set in the future constructed to clarify a possible chain of causal events as well as their decision points" (Kahn and Wiener, 1967, p. 6). Thus, the scenario-making methodology is based on some form of causal analytical reasoning–by determination of the plausible cause-effect relationships between events and possible future outcomes (see e.g., Koonce et al., 2011; Raimond, 1996). The complexity of scenario-producing methods varies, e.g., between an intuitive logic methodology, real options, integrated risk management, probabilistic trends methodology, and prospective methodology (Bradfield et al., 2005; Burger-Helmchen, 2008; Miller and Waller, 2003).

In this paper we will focus on the intuitive logic school (also known as the Shell method). We do so as this method is designed especially to challenge the participants' existing mental models of reality, enabling them to develop new and more proactive strategies (Wayland, 2019). The method is structured around qualitative guided discussion among participants and the identification of potentially future interactive events and conditions, recognizing causal processes and crucial decision points (Cornelius et al., 2005). The group work is centered on identifying a number of important external factors, such as environment,

economics, trends, politics, and others that decisively influence future developments. It helps to better understand future uncertainties and therefore to create causally coherent narratives (Schoemaker, 1993; 1995). Sensitive to the group members' knowledge, abilities, and involvement, the method is primarily qualitative and suitable for describing scenarios that cannot be quantitatively modeled (Pollard and Hotho, 2006, p. 728). Scenario work, therefore, is a process of both individual and organizational sense-making, in which one goes beyond simply building cause and effect models–as these are very often an extension of the past into the future–rather, making foresight a process of creative interpretations of these relationships (McMaster, 1996; Tillmann and Goddard, 2008).

Thus, the purpose of the scenario process is to better master the future by uncovering and influencing its predictors. The literature has previously examined the various potential effects of the foresight intervention on organizations and individuals. For instance, foresight can develop individual leadership capabilities, as well as capacities that can function as a strategic tool for HR development (McWhorter et al., 2008; Rhisiart et al., 2015). Moreover, foresight also improves learning abilities in times of great uncertainty (Cederquist and Goluke, 2016; Haarhaus and Liening; 2020). However, there is still a lack of studies on the purposive evaluation of outcomes attributable to scenario-planning interventions (Balarezo and Nielsen, 2017; Chermack et al., 2006) especially identifying the mechanisms and contextual factors contributing to those outcomes (Frith and Tapinos, 2020; Jefferson, 2020). Examining how foresight as an intervention can mediate relationships between creativity and proactivity and under what conditions it can contribute to uncovering the hidden sides of the scenario's "black box" (Jefferson, 2020).

2.2. Creativity and creative problem-solving

In order to examine how foresight as an intervention can mediate relationships between creativity and proactivity, this section presents a review of the literature on creativity and creative problem-solving. Creative problem-solving is defined as intuitive problem-solving based on bisociative thinking which produces novel ideas based on a non-habitual thought, judgment, decision or action. It is usually distinguished from so-called logical (associative) modes of problem-solving on the basis of proven sets of routines or habits (Jabri, 1991). Associative thinking refers to well-established patterns of actions, procedures, and the usual ways of reasoning that dominate everyday life. As such, it operates within a coherent matrix of thought. Bisociative thinking (Koestler, 1964), on the other hand, relates to the creative act of combining previous unrelated matrices of thought, resulting in new insights (Dubitzky et al., 2012). Bisociation merges elements from different spheres of understanding, blending conflicting information through novel combinations.

In the foresight process, creativity and perceptions must be enhanced to explore uncertainties and detect weak signals. According to the Shell method, creativity is fostered in terms of participants being presented and deliberately confronted with various uncertainties and conflicting information during the scenario-building process (Cornelius et al., 2005). Hence, scenario building requires diverging information to be linked in novel constellations. Besides, creativity is also an important part of the visualization and the communication of the future via narratives (Schwarz et al., 2014).

2.3. Proactivity

In order to examine how foresight as an intervention can mediate relationships between creativity and proactivity, this section presents a review of the literature on proactivity. Proactivity is a vital element of foresight, as it is linked to managerial and entrepreneurial behavior: to explore uncertainty and affect the future through one's own actions (Djuricic and Bootz, 2019). Proactivity is a personal disposition toward proactive behavior, i.e., a relatively stable tendency to bring about intentional environmental change: change that is seen as beneficial from the actor's perspective. Proactivity is therefore related to the managerial ability to take new initiatives for change, enabling managers to influence their environment ahead of time. It can be distinguished from the behavior of managers who go with the flow and conform to the status quo. Proactive behavior is intentional and directed toward altering the current social and non-social circumstances/conditions. Therefore, it differs from "passive" behavior–to react to, adjust to or acquiesce to the environment. By challenging existing mental models of the participants' intuitive logic, the Shell school method fosters the enhancement of proactivity (Wayland, 2019).

Bateman and Crant (1993) find a correlation between proactivity and the need for achievement, for dominance, and civic activities: traits linked associated with transformational leaders. Proactivity relates to the entrepreneurial concept "effectuation" (Sarasvathy, 2009), which is described as a "dynamic and interactive process of creating new artefacts in the world". Here, artifacts also include scenarios, ideas, and actions. Hence, effectuation is when actors under uncertainty engage in a process of exploration and analyze the situation while applying iterative learning methods, exploring how to apply and extend the means under their control, in order to achieve outcomes of interest. As in foresight, effectuation presumes that opportunities are subjective, socially constructed and created through a process of enactment (Fisher, 2012).

2.4. Foresight cognitive styles of participants

In order to examine how foresight as an intervention can mediate relationships between creativity and proactivity, this section presents a review of the literature on foresight cognitive styles of individuals. A future orientation is one of the triggers of proactive behavior (Wu and Parker, 2012). Individuals involved in a scenario-building workshop might initially possess or–through participation in the intervention–subsequently develop or strengthen various discrete cognitive styles of foresight. Distinct from foresight as an intervention process, a future orientation is considered the level of cognitive style to envision possible futures as well as the will to act upon those futures. According to Franco et al. (2013), involvement in the foresight process can activate different cognitive styles, visible in a discrete ability to combine different perceptual and judgmental elements during the foresight process. Involving individuals with different cognitive styles can influence the outcomes of a scenario workshop (Franco et al., 2013). As different people approach complex problems differently, this insight requires managers and scenario trainers to be able to distinguish between the different discrete foresight cognitive styles of those involved in the foresight intervention.

Amsteus (2008) describes discrete foresight styles as degrees of the ability to both analyze present contingencies and move the analysis of present contingencies across time. According to Grant (2003), discrete foresight styles are related to an individual's ability to share and integrate the participants' multiple knowledge bases (Grant, 2003). According to Cederquist and Goluke (2016), an individual's foresight cognitive styles are related to the application of skills acquired through learning, in terms of an improved ability to adapt, transform, and shape one's own future. In this paper, we rely on discrete foresight styles defined as different approaches to anticipating and acting upon the future (van der Laan and Erwee, 2012).

Following Gary (2008); Van der Laan and Erwee (2012) conceptualize four different discrete foresight styles: "Reactor", "Adapter", "Tester", and "Framer". Below we present a short summary of these styles in Table 1.

"Reactor" is a discrete foresight cognitive style in which an individual demonstrates the tendency to resist or avoid change, seeking to preserve their present position and so deny repulses the potential threat. "Adapter" is a discrete foresight style in which an individual adjusts to

Table 1
Differences between discrete foresight cognitive styles in this study (based on Van der Laan and Erwee (2012): 377).

Foresight style	Characteristics
Framer	Interrogates the future; Future time oriented; Interested in the long-term issues that define the future; Envisions "bigger picture" futures
Adapter	Adjusts to new situations as future demands; Balances multiple challenges and choices; Helps others adapt/Is flexible/Activates action; Flexible leadership/Change oriented influencer
Tester	Adopts new trends/Confirms diffusion of innovation theory; Experiments with new trends when they arise; Opportunistic/Not cognitive trend analysis
Reactor	Preserves own position; Mitigates and resists change
Actor	Interactively enacts and transforms the conditions that shape the future/ Alters and influences the unfolding path of the future; Committed to action

the situation as the future demands, instead of adjusting the situation to better match their own needs. The "Tester" style is characterized by a discrete foresight approach in which the individual is aware of and is alert to changes as they take place, showing a propensity to adopt and experiment with approaches fitting these new emerging trends. Finally, "Framer" is a style in which an individual is able to envision bigger futures by exploring the long-term issues that can define the future. Hence, the "Framer" tends to look further into the future, adapting and taking action, in order to benefit from the emerging situation.

In van der Laan and Erwee's (2012) work, most discrete foresight cognitive styles, except "Framer", are, however, quite passive regarding their links to proactivity. To make a better link toward proactivity (Section 2.3), we introduce and test a new discrete foresight style: "Actor" (see Table 1). Based on the entrepreneurship literature, the "Actor" foresight cognitive style can be characterized by an individual propensity to interactively enact and transform the conditions that shape the future. In this sense, the "Actor" foresight style is in line with Horton's (1999) perspective on foresight as commitment to action, adding an upbeat posture aligned with the Amsteus' (2008) perspective of foresight as behavior and action. The "Actor" component of discrete cognitive styles is characterized by a commitment to action. Thus, being similarly in an active position to anticipating potential futures, the "Actor" still differs from the "Framer" in the ability to alter and influence the unfolding path of the future, while the "Framer" waits for the future to unfold and then adapts to it.

Thus, we expect that participation in a foresight exercise will improve the perception of being capable of influencing how the future unfolds as a result of one's own actions. It implies that the individual displays the ability to take action once aware of emerging issues. Hence, the "Actor" discrete foresight cognitive style can represent a more active dimension, describing the propensity to shape the future as it captures the ability to foresee how events are likely to unfold and change the conditions for how the respective futures could be shaped.

2.5. The research model

Based on the reviews of the literature above, we propose a model in which creativity is assumed to fuel the proactive process through the mobilization of different individual cognitive foresight styles in a scenario-planning workshop setting (See Fig. 1). We are interested in finding answers to three research questions:

RQ1: How are creativity and proactivity related within a context of foresight intervention?
RQ2: What are the relationships between creativity and foresight styles within a context of foresight intervention?
RQ3: What are the relationships between foresight styles and proactivity within a context of foresight intervention?

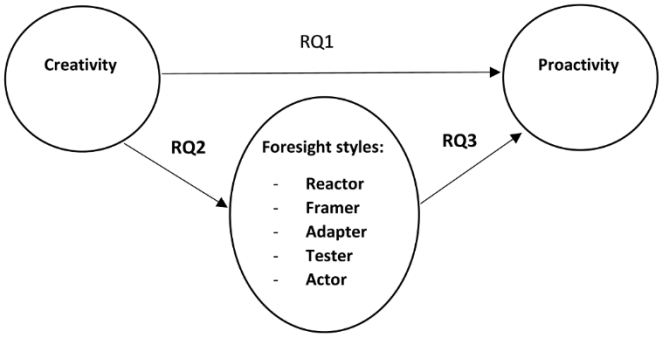

Fig. 1. The research model for this study.

Our research questions and how they connect with each other are presented in Fig. 1.
The next section presents the details of the scenario-building workshop.

3. Research context and approach

The paper describes a scenario-building workshop that is part of an international master's course. This scenario-building workshop is based on an intuitive logic school scenario method developed by Shell. Schoemaker (1993: 197; 1995) recommended a 10-step procedure for applying the scenario method adhering to the Shell procedure: 1) define the scope; 2) identify the major stakeholders; 3) identify basic trends that affect the issue; 4) identify key uncertainties and identify relationships between them; 5) construct initial scenario themes; 6) check consistency and plausibility; 7) develop learning scenarios, i.e. themes that are strategically relevant, with possible outcome and trends; 8) identify knowledge needs by exploring blindspots in the evolving scenarios; 9) develop quantitative models; and finally 10) evolve towards decision scenarios. Following those recommendation, the paper investigates a scenario-building workshop that is part of a bigger 7.5 ECTS course for international master's students, addressing international governance and business in the Arctic. The workshop lasted for two days of a week-long course. During the course, the students learn about present as well as future opportunities and challenges for value creation in the Arctic. The scenario-building part of the course aims to develop particular areas of knowledge among students, e.g., to better understand the theoretical underpinnings of foresight management practices as well as the basic components of scenario-building methodologies. The students are required to apply this emerging knowledge during the scenario-building workshop in order to discuss and analyze the complex interplay between the (geo) political, economic, legal, technical, environmental, etc. driving forces possibly affecting the future of the Arctic. They also need to exercise their creativity in solving potential challenges and problems of the Arctic while demonstrating their communication skills by providing convincing arguments regarding the scenarios developed. All in all, the idea is that students, relying on their individual emerging knowledge, would collectively produce scenarios of a plausible development trajectory for the Arctic region. The evaluation of students' participation in the scenario workshop is expressed in a "pass/not pass" grade. Students are also required to submit a paper to receive a (A-F) as a requirement for course completion.

The design of the two-day the scenario-building workshop is presented in Fig. 2.

Stage 1 Preparation has a dual focus: 1) to give students the necessary background and knowledge to contribute in the scenario workshop and 2) to ensure that students are divided into groups ensuring an appropriate mix among the participants. Stage 1 lasts from students' course enrolment in January until their physical arrival on campus at the end of March/beginning of April. The course is intended for students from different disciplines and educational backgrounds but who share

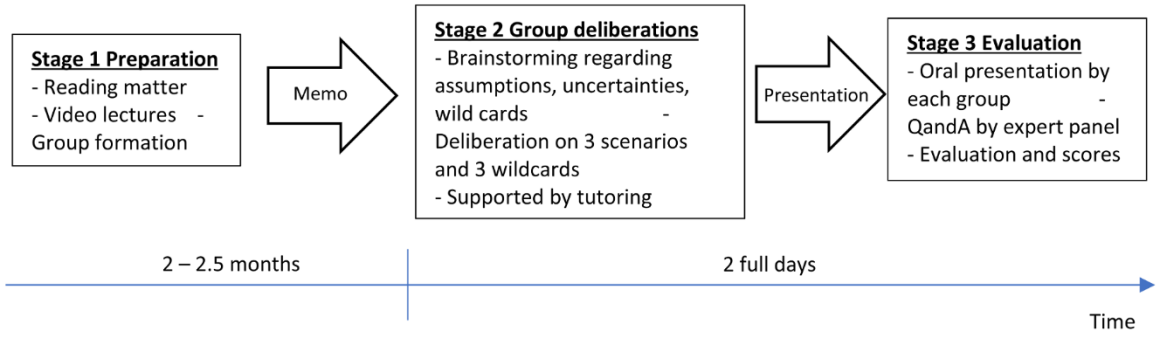

Fig. 2. Schematic design of the student scenario-building workshop.

an interest in Arctic issues. Course reading matter and video lectures are developed specifically to ensure that students are equally prepared and have the same baseline regardless of their study backgrounds or interests. For instance, students are provided with literature and sources of information on the subject and the context of the scenario building (e.g. "Arctic Industry Development"). As most of the students have not previously encountered scenario methodology, we require them to engage in advance in extensive theoretical reading and to explore examples of how the method of scenario planning plays out. The basic idea is to ensure that all students are well prepared before they physically attend the scenario-building workshop. As the quality of the discussions depends on upon the quality of individual preparation, each student is also required to develop and submit an individual memo by describing at least ten trends deemed relevant for discussion during the scenario-building workshop. Each report should be submitted a week before arriving on site, allowing the tutors to ensure that the students are indeed prepared for the scenario planning workshop.

Stage 2, Group Discussion, starts when the students have physically arrived on campus and are engaged in the two-day scenario-building workshop. During the first half of Day 1, some introductory lectures are delivered, likewise updates on the topics and instructions regarding what students are expected to do and to deliver. On the second half of Day 1, students gather in pre-assigned groups for brainstorming and further discussion. According to the Shell methodology, students are instructed to address present and future trends in terms of trying to identify possible future events. The groups are asked to categorize these as assumptions, uncertainties, and wild cards. The brainstorming and discussions should result in consensus within the group on what factors are collectively deemed to merit further investigation.

During the first half of Day 2, the group work continues but students are asked to evaluate and combine different uncertainties in developing three scenarios and at least three wild cards. They are also asked to scrutinize scenarios for consistency and visualize these by plotting terms on a radial chart diagram highlighting how different uncertainty factors interact in each scenario. They should also write and submit a brief field report, explaining their thought processes when making scenarios.

On both days, the course faculty functions as tutors facilitating the work of the groups. Tutors make several rounds and visit each group on both days to answer questions, to clarify misconceptions and, generally, to observe the work of the groups.

Finally, Stage 3, Presentation and Evaluation, starts during the second part of Day 2. Each group is asked to give a 15-minute presentation of their scenarios. They are instructed to confine themselves to no more than five power-point slides to ensure a focused presentation. The presentations and reports are evaluated by an interdisciplinary expert panel consisting of six to seven experts in the field of Arctic development, who are both academics and practitioners. The presentations are followed by a 15-minute Q-and-A session where the experts, in turn, evaluate the plausibility and quality of scenarios presented, provide students with feedback on the strengths and weaknesses of their work, and elicit further explanations.

As a "pass/not pass" workshop evaluation component may discourage students from making extra efforts, we have added a gaming component in order to make the presentation component more exciting. Inspired by the way judges evaluate the performance of singers in the show "America's got talent", the performance of each group is accessed by a total sum of individual scores (ranging from 0 (lowest) and 10 (highest)) from each individual panel member. When all the groups have completed their presentations, the expert panel meets in a separate room to discuss the overall group performance and, if necessary, adjust the scores of the groups before announcing to all groups the three best-performing groups as well as the outright winner. The winning group then present their scenarios at a subsequent Arctic conference in front of some 250–300 conference participants. Each member of the winning group also receives a diploma and flowers in recognition of their achievements.

The scenario-building workshop stimulated students' creativity. First, for most of the students, such a scenario-building workshop was quite a new experience. Although many of them possessed theoretical knowledge regarding how scenarios can be constructed, only moderated interactions during the brainstorming and deliberation stages provided them with tacit knowledge on what scenario-building is in practice. Second, the students were only given instructions on the deliverables and the basic components of the scenario methodology, not on how to organize their work so as not to limit their creativity in organizing their foresight processes. In this respect they were self-organizing. Third, the intensity of the program was fairly high, with a minimum of breaks and a demanding set of deliverables that explicitly mobilized the cognitive resources of participants. Finally, and probably the most creative component of the workshop, the groups were encouraged to make innovative visualizations of the future, by providing "narrative fictions" about situations which, given the present level of knowledge, are not feasible at this time due to the level of societal development. It was not uncommon for the groups to present their scenarios as role play, thereby involving all members of the group.

4. Methodology

The sample consists of 325 completed questionnaires from 172 master's students participating in this week-long intensive course involving a scenario-building exercise as a tool for handling significant emerging problems. The course has been offered for several years, and the data for this study represent two cohorts: those of 2017 and 2018. About 60% of the students responded to our survey each year, thereby yielding a total of 172 responding students (86 in 2017 and 86 in 2018).

We addressed the students through an online survey, asking them to complete the survey at three time points–a couple of days before arriving on campus and embarking on the foresight workshop, immediately after completing the workshop, and several months after completing the course. We did so as the scenario-workshop raised the students attention to issues related to creativity, foresight and proactivity. We wanted to use this heightened attention as a magnifying lens for to get a clearer

picture of the relationship between these issues. Our sample included master's students from 25 countries; their ages ranged from 22 to 62, mean 27 years. They were studying subjects such as business, energy management, climate change, politics, computer science, corporate finance, law, economics, environmental governance, geopolitics, international relations, engineering, risk and disaster management, petroleum logistics, public governance and sustainability.

The survey was built upon and derived from the theoretical discussion, as indicated in the theory section. The "Actor" concept was introduced because of the discussion on effectuation. The same procedure was followed for both the data collection and the scenario workshop in the two years.

Proactivity was measured by the Bateman and Crant (1933) measure of Proactivity as a personal disposition toward proactive behavior. The measure was captured by a 7-point Likert scale where 1 equals "Totally Disagree" and 7 equals "Totally Agree". Their measure consists of 17 items. Through a Principal Component Analysis (PCA), items with loadings lower than 0.5 and extractions lower than 0.5 (Hair et al., 1998) were eliminated, leaving eight items for further study. Guided by Kenny (1979, p. 143), who claims that three or four sound items are a sufficient number of psychometric indicators: "Two might be fine, three is better, four is best, and anything more is gravy", we maximized the measures of Cronbach's alpha by deleting four more items. This study then utilized a subsample of the Bateman and Crant (1933) measure of Proactivity of four items, leaving a Cronbach's alpha of 0.857. The remaining items and their loadings, extractions and variance explained are presented in Table 2.

Creativity was measured by the Jabri (1991) measure of creativity as a bisociative mode of problem-solving. The measure was captured by a 7-point Likert scale where 1 equals "Totally Disagree" and 7 equals "Totally Agree". The Jabri (1991) measure consists of nine items. Through a PCA, items with lower loading than 0.5 and lower extractions than 0.5 (Hair et al., 1998) were eliminated, leaving eight items for further study. Also, guided here by Kenny (1979, p. 143), we maximized the measures of Cronbach's alpha by deleting five more items. This study then utilized a subsample of the Jabri (1991) measure of Creativity of three items, leaving a Cronbach's alpha of 0.744. The remaining items and their loadings, extractions, and variance explained are shown in Table 3.

Discrete cognitive foresight styles (Foresight) were measured by an item battery measuring foresight abilities derived from van der Laan and Erwee (2012) and Gary (2008). The van der Laan and Erwee (2012) study states that foresight abilities consist of four components: "Framer", "Adapter", "Tester" and "Reactor". The van der Laan and Erwee (2012) study showed low item loadings on two items measuring the "Reactor" component. Furthermore, the "Adapter" measure consisted of only two items. In an attempt to strengthen the measurement of these components and adjust the measures to a student situation, this study derived some new items based upon the work of Gary (2008). Moreover, inspired by the discussion in the theory section regarding effectuation, we added some items on the propensity to interactively enact and transform the conditions shaping the future.

Table 2
Measure of Proactivity, derived from Bateman and Crant (1993).

Principal component analysis	Proactivity	Extraction
Q11.3- Nothing is more exciting than seeing my ideas turn into reality	0.806	0.649
Q11.5- No matter what the odds, if I believe in something, I will make it happen	0.870	0.757
Q11.8- I am always looking for better ways to do things	0.822	0.676
Q11.9- If I believe in an idea, no obstacle will prevent me from making it happen	0.849	0.720
Rotation method: Varimax with Kaiser normalization		0.770
Explained% of variance	70.07	
Cronbach's alpha	0.857	

Table 3
Measures of Creative Ability, derived from Jabri (1991).

Principal component analysis	Creativity	Extraction
Q9.3- Linking ideas which stem from more than one area of investigation	0.806	0.650
Q9.4- Being fully occupied with what appear to be novel methods of solution	0.815	0.665
Q9.5- Making unusual connections about ideas even if they are trivial	0.821	0.674
Rotation method: Varimax with Kaiser normalization		0.690
Explained% of variance	66.32	
Cronbach's alpha	0.744	

Based upon the core of the proposed new discrete foresight styles and the nomological content of the wording, we labeled this discrete foresight style "Actor". The measure was captured by a 7-point Likert scale where 1 equals "Totally Disagree" and 7 equals "Totally Agree". The wordings of the items with their loadings and extractions are displayed in Table 4, which also shows that the Kaiser-Mayer-Olkin measure of sampling adequacy (KMO) is 0.832 and within the acceptable range (Hair et al., 1988). A PCA yielded five components of foresight abilities: "Tester", "Framer", "Adapter", "Reactor", as well as the new factor – "Actor".

5. Results and discussion

In the theoretical model presented in Fig. 1, we assumed that there are relations between Creativity and Proactivity through Foresight. Therefore, we tested our assumptions by means of a structural equation model (SEM). For scientific purposes, we prefer a model that explains as much of the variance as possible, but we also prefer a simpler model over a more complex one. Hair et al. (1998, p.623 and 636) claim that a SEM model's goodness-of-fit indexes, such as AGFI, NLI and TLI, should be higher than 0.9 but could be accepted as marginal at a level of 0.8 . Kline (2011, p. 195) explains that "If the value of an absolute fit index is 0.85, then we can say that the model explains 85% of the observed covariances". Our goodness-of-fit indexes are in the range of 0.836 to 0.924. Hair et al. (1998) recommend RMSEA to be lower than 0.10 for acceptable models, while Hu and Bentler (1999) claim that RMSEA below 0.06 indicates a very good fit to the data. Furthermore, Kelloway (2015) recommends SRMR to be lower than 0.08; the present model's SRMR is 0.060, while RMSEA is 0.069 with 90% confidence intervals at 0.062–0.077.

There will always be alternative untested models when performing SEM analysis, and any suggested model is at best only an approximation of reality (Mueller and Hancock, 2008). Any proposed model must be based upon theoretical underpinnings. SEM is a confirmative method, guided more by theory than by empirical results (Hair et al., 1998, p. 590). In light of this discussion, we could claim that our SEM model, linking Creativity to Foresight, and Foresight to Proactivity, where Foresight consists of the five components, namely Tester, Framer, Adapter, Reactor, and Actor, showed acceptable fit indicators (Hair et al., 1998) and could be the basis for further analyses. Hence, the proposed model allows us to discuss its implications.

The results of the SEM analysis are presented in Fig. 3. The model allowed us to answer our research questions in the following way.

RQ1 was "How are creativity and proactivity related within a context of foresight intervention?" The SEM model indicates that Creativity is not directly linked to Proactivity (only weak and insignificant correlation of 0.12). The link between these two factors seems only be meaningful when we examine what students' cognitive foresight styles are activated in the scenario foresight workshop.

Our RQ2 was "What are the relationships between creativity and foresight styles within a context of foresight intervention?" Fig. 3 shows that Creativity correlates with all five components of Foresight: "Actor", "Tester", "Adapter", "Framer", and "Reactor". The correlation is positive

Table 4
Discrete foresight measure components (Foresight), derived from Gary (2009) and van der Laan and Erwee (2012).

Principal component analysis	Framer	Reactor	Tester	Actor	Adapter	Extraction
Q18- I seek ways to change the world				0.838		0.795
Q19- I see myself as a trendsetter			0.423	0.780		0.790
Q20- I can make an impact on the future				0.839		0.823
Q6- I don't want too much change		0.790				0.670
Q7- I'm against changes that threaten my current position		0.918				0.847
Q8- I don't like changes that disrupt my situation		0.912				0.833
Q10- I'm on the lookout for opportunities created by new trends	0.331		0.672			0.639
Q11- I test new trends/products early			0.884			0.824
Q12- I like to explore how I can exploit new trends			0.808			0.787
Q1- I'm interested in future questions	0.853					0.848
Q2- I read and focus on greater future questions	0.882					0.902
Q3- I have my attention on future questions	0.867					0.864
Q14- When the future demands it, I change my ways					0.795	0.713
Q15- I go along with new trends when they come			0.327		0.721	0.641
Q16- I adjust to new situations when I need to					0.757	0.665
Rotation method: Varimax with Kaiser normalization, loading less than 0.30 is suppressed						0.834
Explained% of variance	17.9	15.8	15.6	15.0	13.3	77.6
Cronbach's alpha	0.929	0.854	0.833	0.824	0.721	

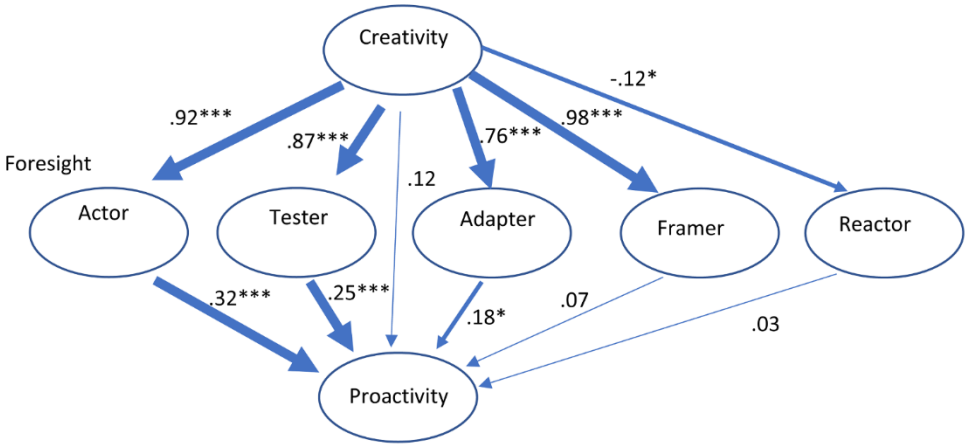

Fig. 3. SEM model of Creativity, discrete Foresight and Proactivity.* *n = 325; Chi-square (x2) = 507.567; Degrees of freedom (DF) = 198; Normed chi-square (x2/df) = 2.563; Root Mean-Square of Error of Approximation (RMSEA) = 0.069; SRMR = 0.060; Tucker-Lewis Index (LTI) = 0.912, Comparative Fit Index (CFI) = 0.924; Goodness-of-fit Index (GFI) = 0.871; Adjusted Goodness-of-fit Index (AGFI) = 0.836; NFI = 0.882. Source: R sem_3.1–9.tar.gz.

for all components, except for the "Reactor" component. The strongest correlation is with the "Framer", "Actor" and "Tester", components, while the correlation between Creativity and "Adapter" is somewhat weaker but still equally significant. The model indicates that Creativity is linked to Foresight as an ingredient thereof. Creativity is strongly positively linked to all facets of Foresight that measure the ability or tendency to analyze and respond to future challenges, while it is potentially negatively linked to the tendency to deny the problem and avoid change (the "Reactor" component).

RQ3 stated "What are the relationships between foresight styles and proactivity within a context of foresight intervention?" As Fig. 3 shows, the link between Creativity and Proactivity is only through the "Actor", "Tester", and "Adapter" components of Foresight. The influence on Proactivity is strongest for "Actor", followed by the influence of the "Tester" component. The influence from "Adapter" is weaker and also less significant than the influence from the "Actor" and "Tester" components of Foresight. Hence, we can assert that, despite Creativity not being directly linked to Proactivity, it can be linked to Proactivity only via some of the aspects of Foresight.

This research contributes several novel insights, especially as regards determining the relationship between Creativity, Foresight, and Proactivity. The first insight is that cognitive foresight styles consist of five components: the "Tester", "Adapter", "Framer" and "Reactor" components, as well as the new proposed element, "Actor". These five foresight components, however, relate to Proactivity (i.e., the action-related dimension) in decidedly different ways. The "Actor" component measures the inclination of an individual to change the conditions for the unfolding events, in order to steer the future towards a more beneficial position. This is in contrast to the "Tester", who seeks to exploit the new situation, and also to the "Adapter", who is inclined to accept the situation and adapt to it. This also differs from the "Framer", who observes how things unfold, as well as to the "Reactor", who would prefer to avoid the situation. The "Actor" perspective is then more active than the "Tester" perspective in shaping the future, while both perspectives are active toward responding to changes as they unfold. The "Adapter" perspective affords a weaker link between Creativity and Proactivity because responding to changes as they unfold has been less inculcated. This implies that the individual adjusts to the situation rather than adjusting the situation to fit his/her own needs, as in the "Tester" style. The "Actor" perspective implies that the individual foresees how events are likely to unfold and changes the conditions for how the future will be shaped. The behavior that the "Actor" discrete foresight cognitive style describes is then the preferred solution to the problem that the emerging situation produces. These five different cognitive foresight styles demand different types of information, as the individual perception of the emerging situation demands different types of action. Table 5 provides a summary of the discrete foresight cognitive styles discussed in this study and how they differ in their ways of anticipating the future and then act

Table 5
Differences between discrete foresight cognitive styles in this study.

	Reactor	Adapter	Tester	Framer	Actor
Anticipating futures	Avoid	Await	Awareness	Envision	Envision
Acting upon futures	Resist	Adjust	Experiment	Adapt	Alter

upon it.

The second insight is the link between Creativity and Proactivity and the role of Foresight in this relationship. A significant finding is the indicated link between Creativity and Proactivity through Foresight. Creativity was found to be strongly positively associated with Proactivity through the Foresight components such as "Actor", "Tester", and "Adapter". The "Actor" component is measured by items related to the respondents' perceptions of their capabilities to influence how the future unfolds as a result of their own actions. The "Tester" component of Foresight is measured by items capturing the respondent's awareness of and alertness to changes that occur, while the "Adapter" measure captures a propensity to adjust to a situation as it unfolds. Obviously, this has implications for the ultimate goals of the creative process, as individuals seek different cues and perceive the challenge differently.

SEM enables the modelling of the direction of influence between latent constructs. When modeling the reverse direction of influence, i.e., from Proactivity to Creativity through the five Foresight components, the model received equally good measures of fit, but the link between Foresight and Creativity was limited to the "Framing" component of Foresight. Hence, this alternative testing of the model substantiates the claim that Creativity does indeed influence Proactivity through the "Actor", "Tester", and "Adapter" components of Foresight. The present study is cross-sectional, so we hesitate to make strong claims about causality and the direction of such causal links. We still argue, however, that the present study demonstrates that Creativity aids Foresight, and that the "Actor", "Tester", and "Adapter" components of Foresight aid Proactivity.

6. Conclusion and implications

The aim of the study was to explore the links between creativity, foresight abilities, and proactivity. Our main research question was *"How does foresight translate creativity into proactive behavior"?* To answer this question, we analyzed quantitative data collected at several points in time from 172 students attending two scenario-building workshops.

Our findings and discussion demonstrate that students' creativity is not directly linked to proactivity. Possessing a creative problem-solving ability does not necessarily foster proactivity unless some particular student's foresight abilities are stimulated during the foresight workshop. In this vein, the foresight intervention in itself is not a panacea for transforming creativity into proactive action or creating anticipatory strategic management capacity, but barely a precondition that can stimulate this relationship. Our investigation also reveals that only some specific individual foresight styles – such as "Actor", "Tester" and "Adapter" - foster proactivity, but not those of the "Framer" or "Reactor" styles. We also find that a new proposed foresight style, "Actor", emerges from the intervention as the most significant aid to proactivity.

The insight that the "Actor" foresight style is a vital component in Foresight carries important implications for research. As suggested by Horton (1999) and Amsteus (2008), this study claims that action could be regarded as a component of Foresight. This opens the door to an array of research on how, when, and to what extent individuals take action on becoming aware of emerging issues. Adding the "Actor" perspective as a discrete foresight cognitive style, into the foresight portfolio allows us to view foresight as a vehicle for translating creativity into proactive behaviors. "Actors" master the future by influencing its preconditions and change the conditions that shape the future. Foresight then describes the process whereby a person perceives hints of future situations and their preferred modes of action in these different potential states. Thus, this paper contributes to the literature on foresight styles (Amsteus, 2008), by uncovering a significant new dimension of the foresight cognitive style inventory–"Actor"–that links creativity to proactivity (van der Laan and Erwee, 2012).

A further contribution is in demonstrating under what conditions the foresight process, as an organizational process of intervention, can enhance learning processes which, in turn, can facilitate the development of new abilities at the individual level – abilities such as creativity and proactivity (McWhorter et al., 2008; Cederquist and Goluke, 2016; Frith and Tapinos, 2020; Jefferson, 2020). In cases where foresight interventions aim at translating creativity into proactive behavior, interventionists need to pay attention to stimulating the development of the "Actor", "Adapter", and "Tester" individual foresight abilities of foresight participants.

6.1. Implications and suggestions for future research

The findings in this paper can contribute some important insights regarding how the application of foresight methods can aid strategic management and human resource management in training both more creative and more proactive employees and managers. First, to improve strategic management, it might be a good idea to organize regular foresight interventions as they can stimulate collective creativity, proactivity, and foresight abilities that may lead to better strategic management practices in organizations. Research shows that many managers overestimate their own control ability (e.g., Schwenk, 1984) and that, in an uncertain world, strategic management tools can be a source of managerial "comfort", giving a false sense of predictability (Bourmistrov and Kaarbøe, 2013). The successful use of scenario thinking for management purposes is already well documented in the accounting literature (see e.g., Palermo, 2018) and increasingly suggested as a way out of reactive strategizing (see e.g., Scoblic, 2020). However, further research is needed to document whether and how the interplay between creativity, proactivity, and foresight abilities improves strategic management practices and performance in organizations.

Second, our data does not allow us to speculate on how the creative processes differ between these discrete foresight cognitive styles, except that the analysis shows that the "Reactor" foresight cognitive style is negatively or not correlated with Creativity. This may imply that those who do not want to relate to the upcoming change seem to be less creative due to the very weak negative correlation between Creativity and the "Reactor" measure. Could it be that encouraging their creativity would allow them to see novel ways of handling the emerging problems, and eventually provide the "Reactors" with the confidence to face the problem and do something about it? We leave these questions open for others to investigate.

Third, this study gives us some indications of how to improve the human resource management, education, and training of present and future employees, based on the use of scenario intervention methodology, to enable them to act proactively. For instance, if companies seek employees who are both creative and proactive, they can refine their recruitment policies in order to identify and recruit future employees with "Tester", "Adapter", and "Actor" discrete foresight cognitive styles, by adjusting recruitment interviews or tests. Given the positive link between Creativity and Proactivity through the "Actor", "Adapter" and "Tester" components of Foresight, educational and training practices can also be improved. Educators interested in equipping their students with knowledge-backed confidence in their ability to engage in changing the path of the future may want to provide their students with tools to enhance their creative capacity, emancipated through foresight skills. According to the findings in this study, such an offer would eventually improve the proactive ability of the students. For instance, combining foresight with real option reasoning (Cornelius et al., 2005; Miller and

Waller, 2003; Burger-Helmchen, 2008) can be an interesting opportunity for students to learn proactivity in new ways. However, more research is needed, especially regarding whether, how, and by what means the "Actor", "Adapter" and "Tester" foresight cognitive styles can be enhanced in individual or group training.

We have also combined data from three points in time; "before", "just after" and then "long-after" the completed workshop. Running our SEM-model on each of these datapoints showed similar results, indicating that we not report temporarily results from "just after" a completed workshop, but more lasting relationships. This then raises the question on how to measure the impact from such scenario-workshops.

6.2. Limitations

The main limitation of this study is that our research has involved students, not company employees. Although life-long learning is an important aspect of improving human resources, the results of this study can be applied to training in companies with some caution.

As both the Creativity and the Proactivity measures were enhanced by eliminating items present in the original measures proposed by Jabri (1991) and Bateman and Crant (1993), this demands further effort to confirm the consistency of these measures.

Other technical aspects also call for further research. The high side loading on the item "I go along when new trends come" between the "Tester" and the "Adapter" components and adding the Actor component to the Foresight construct demands further work to refine this construct. The Foresight measure components derived in the PCA (see Table 3) invite researchers to develop an improved item battery with item wordings better linked to the underlying latent set of constructs constituting these discrete foresight elements.

Author statement

We declare that all authors have seen and approved the final version of the manuscript being submitted. This paper is our join original work, has not received prior publication and has not been previously submitted to any other journal than Technological Forecasting and Social Change.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.techfore.2021.121215.

Appendix. The survey questionnaire

Item #	Type	1	2	3	4	5	6	7
Demographic variables								
A1	Gender	M	F					
A2	Year of birth	#						
A3	Your nationality	txt						
A4	Your topic of study	txt						
Creative ability, from Jabri (1991)								
Please indicate to what extent you totally disagree or totally agree with the following statement regarding yourself		TD			N			TA
B.1	Being confronted with a maze of ideas which may, or may not, lead me somewhere							
B.2	Pursuing a problem, particularly if it takes me into areas I don't know much about							
B.3	Linking ideas which stem from more than one area of investigation							
~~B.4~~	~~Being fully occupied with what appear to be novel methods of solution??O~~							
B.5	Making unusual connections about ideas even if they are trivial							
~~B.6~~	~~Searching for novel approaches not required at the time~~							
~~B.7~~	~~Struggling to make connections between apparently unrelated ideas~~							
~~B.8~~	~~Spending time tracing relationships between disparate areas of work~~							
~~B.9~~	~~Being 'caught up' by more than one concept, method or solution~~							
Proactivity, from Bateman and Crant (1993)								
Please indicate to what extent you totally disagree or totally agree with the following statement regarding yourself		TD			N			TA
C.1	I am constantly on the lookout for new ways to improve my life							
C.2	Wherever I have been, I have been a powerful force for constructive change							
C.3	Nothing is more exciting than seeing my ideas turn into reality							
~~C.4~~	~~If I see something I don't like, I fix it~~							
C.5	No matter what the odds, if I believe in something I will make it happen							
~~C.6~~	~~I love being a champion for my ideas, even against others' opposition~~							
~~C.7~~	~~I excel at identifying opportunities~~							
~~C.8~~	~~I am always looking for better ways to do things~~							
~~C.9~~	~~If I believe in an idea, no obstacle will prevent me from making it happen~~							
~~C.10~~	~~I can spot a good opportunity long before others can~~							
Foresight, derived from Gary (2009) and van der Laan and Erwee (2012)								
Please indicate to what extent you totally disagree or totally agree with the following statement regarding yourself		TD			N			TA
D.1	I'm interested in future questions							
D.2	I read and focus on greater future questions							
D.3	I have my attention on future questions							
~~D.4~~	~~I'm on the lookout for big trends in society~~							
~~D.5~~	~~I consider how trends interact~~							
D.6	I don't want too much change							
D.7	I'm against changes that threaten my current position							
D.8	I don't like changes that disrupt my situation							
D.9	I take advantages of trends that pop up							
D.10	I'm on the lookout for opportunities created by new trends							
D.11	I test new trends/products early							
~~D.12~~	~~I like to explore how I can exploit new trends~~							
~~D.13~~	~~I usually adapt to trends after a while~~							

(continued on next page)

(*continued*)

Item #	Type	1	2	3	4	5	6	7
D.14	When the future demands it, I change my ways							
D.15	I go along when new trends come							
D.16	I adjust to new situations when I need to							
~~D.17~~	~~I can shape my future~~							
D.18	I seek ways to change the world							
D.19	I see myself as a trendsetter							
D.20	I can make an impact on the future							
TD	Totally Disagree							
N	Neutral							
TA	Totally Agree							
M	Male							
F	Female							

Note. The deleted items gave lower Cronbach alphas and were not included in the analysis of this paper.

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