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**FUTURES CONSCIOUSNESS
AS A HUMAN ANTICIPATORY
CAPACITY**

Definition and Measurement

Sanna Ahvenharju



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*To my children as well as all the children in the world – and their future
Be their fears a source of action, and their action a source of hope*

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ABSTRACT

As the world has become more complex, our minds are ever more challenged in understanding the potentials and possibilities of future developments. To overcome these challenges, we must develop and challenge our minds and the way we see ourselves and our surroundings, so that we can better navigate towards the future. This dissertation presents a conceptualisation and operationalisation of a novel five-dimensional concept of Futures Consciousness (FC) and embeds it in the framework of Anticipatory Systems. Furthermore, it uses psychological constructs to identify individual differences as means to describe anticipatory capacities.

The study identifies five different dimensions: time perspective, agency beliefs, openness to alternatives, systems perception and concern for others that together form an integrated concept of Futures Consciousness. This model is further operationalised with a psychometric scale that measures the manifestation of Futures Consciousness among individuals. The development of the FC Scale confirms that Futures Consciousness is not just a theoretical model, but an actual phenomenon that lends itself to empirical study.

The work presented in this dissertation is a result of collaborative efforts between social and personality psychologists and futures researchers utilising both quantitative and qualitative methods to develop the conceptualisation drawing on both scientific traditions. This summary sets the theoretical grounds for Futures Consciousness as a human anticipatory capacity that can be applied to both individuals and collective systems. This capacity is not domain – nor situation – specific, but a more general capacity that persists across various situations and over time, and is present in various life domains, such as work, education, and family, as well as in response to global issues. As such, studying and measuring individual variations in Futures Consciousness could prove useful in education, governance, capacity building, business development, and research.

KEYWORDS: Futures consciousness, future thinking, future orientation, anticipation, futures literacy, foresight, time perspective, futures education

TURUN YLIOPISTO

Turun kauppakorkeakoulu

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Tulevaisuudentutkimus

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TIIVISTELMÄ

Jatkuvasti monimutkaisemmaksi muuttuva maailma haastaa ymmärryksemme sekä käsityksemme tulevaisuudesta. Näiden haasteiden edessä meidän on kyseenalais-tettava ja kehitettävä ajatustapojamme sekä oletuksiamme itsestämme ja ympäris-töstämme. Tämä väitöskirja esittelee uuden viisiulotteisen tulevaisuustietoisuuden käsitteen (Futures Consciousness (FC)) sekä sitä kuvaavan psykometrisen mittarin. Tulevaisuustietoisuus asemoidaan työssä ennakoivien järjestelmien (Anticipatory Systems) ominaisuuksia kuvaavaksi käsitteeksi. Näiden yksilöllisten erojen kuvaamisessa hyödynnetään psykologiassa tunnistettuja yksilöiden taipumuksia sekä personaalisuuden piirteitä.

Väitöskirjassa esitetään tulevaisuustietoisuudelle viisi eri ulottuvuutta: aikakäsitys, toimijuus, avoimuus vaihtoehdoille, systeemisyyys ja vastuullisuus, jotka yhdessä muodostavat yhtenäisen tulevaisuustietoisuuden käsitteen. Ulottuvuuksien ilmenemistä yksilöiden välillä voidaan mitata työssä kehitetyllä psykometrisella mittarilla. Mittarin kehitys vahvistaa, että tulevaisuustietoisuus ei ole vain teoreettinen malli, vaan ilmiö on todella olemassa ja sitä voidaan empiirisesti tutkia.

Tulevaisuustietoisuuden käsite ja mittari ovat syntyneet sosiaali- ja persoo-nallisuuspsykologien sekä tulevaisuudentutkijoiden tiiviin yhteistyön tuloksena. Työssä on hyödynnetty sekä kvantitatiivisia että kvalitatiivisia menetelmiä perustuen kummankin tieteenalan perinteisiin. Tämä yhteenveto asettaa teoreettiset perusteet tulevaisuustietoisuudelle ihmisen ennakoivuutta kuvaavana kykynä, jota voidaan soveltaa sekä yksilöihin että kollektiivisiin järjestelmiin. Kyseinen kyky ei riipu tilanteesta tai ympäristöstä vaan se on perustavanlaatuisempi ominaisuus, joka ilmenee eri elämänalueilla, kuten työssä, koulutuksessa ja perheessä, sekä suhtau-tumisessa globaaleihin kysymyksiin. Yksilöiden välisten tulevaisuustietoisuuden vaihtelun sekä tulevaisuustietoisuutta kasvattavien kokemusten tutkiminen ja mit-taaminen voi osoittaa hyödylliseksi niin koulutuksessa, hallinnossa, valmiuksien kehittämisessä, liiketoiminnan kehittämisessä kuin tutkimuksessakin.

ASIASANAT: Tulevaisuustietoisuus, tulevaisuusajattelu, tulevaisuusorientaatio, antisipaatio, ennakointi, tulevaisuuslukutaito, aikaperspektiivi, tulevaisuuskasvatus

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I am not into statistics, nor do I see myself as a quantitatively oriented researcher, and least of all, I am not a psychologist. Hence, publishing a dissertation that heavily relies on all these subjects means that I am indebted to a number of amazing people who have taught me along the way. Thank you to Fanny Lalot, who explored the marvels of psychology together with me and who was always there to fearlessly and tirelessly grasp any task at hand and persist until the work was done. Thanks to your skills and efforts, the statistical research required for the scale development was done in a way that we can be proud of. Thank you also to Alain Quiamzade, a great mentor and a kind guide who steered our work towards a direction that was acceptable to a scientific audience, not only exciting for us. Thank you to my fellow futurist on this journey, Matti Minkkinen, for always being there, ready for philosophical ponderings, and for having such a curious and analytical mind. Special thanks to Enrico Wensing and Titta Tapiola for our regular, lengthy, and inspiring talks on futures consciousness, and the former for first introducing us to the secrets of psychology and bringing Fanny in to our discussions.

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Publishing interdisciplinary academic work can be a challenge, and it certainly was so for few of the articles featured in this dissertation. Therefore, I want to particularly thank Professor Ted Fuller, the editor of *Futures*, for his patience with our long and winding manuscripts and his persistence in finding reviewers with understanding of both futures research and personality psychology. In addition to knowledgeable article reviewers, I want to especially thank the reviewers of this dissertation: futurist Andy Hines – who kindly has agreed to be my Opponent – and psychologist Maria Ojala, for encouragement, constructive critique and helpful advice. I also want to extend my thanks to the Tiina and Antti Herlin Foundation, Kone Foundation and Turku University Foundation for funding my research. Your support allowed me to focus on my work, refocus my topic when it seemed reasonable, and in the end, to create something totally new I had not planned for. Finally, thank you Sam Parwar for checking my language.

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Turku, 16.5.2022
Sanna Ahvenharju



SANNA AHVENHARJU

A political scientist (M.Soc.Sci.), practitioner and activist turned into an academic in futures research. A lifelong interest and twenty-year career as a practitioner in sustainability questions eventually raised her curiosity towards understanding the motivations behind sustainable, future-conscious behaviour. In addition to her academic passions, Ahvenharju is a wife and mother of four as well as an avid outdoor enthusiast.

Table of Contents

Acknowledgements	6
List of Original Publications	12
1 Introduction	14
1.1 Faults in our futures.....	15
1.2 The future challenges our (beautiful) minds.....	16
1.3 Aims and structure of this dissertation.....	17
1.4 Disclaimer concerning the author's bias	18
2 Futures ‘something’ – studying future capabilities and capacities.....	19
2.1 Aiming for conceptualisation and operationalisation	19
2.2 Existing approaches to future capabilities and capacities	21
2.2.1 Future orientation and time perspective.....	22
2.2.2 Anticipation and futures literacy.....	23
2.2.3 Foresight thinking.....	25
2.2.4 Future consciousness.....	26
2.3 Filling the gap.....	27
3 Theoretical framework – from images of the future to anticipatory capacities	29
3.1 The images of the future as a driver of social and behavioural change	29
3.2 Images of the future as part of anticipatory processes.....	32
3.3 Variations in the outcomes of anticipatory processes depend on differences in anticipatory capacities	35
4 Methodology – futures research meets psychology.....	37
4.1 Interdisciplinary approach.....	37
4.1.1 Methodological and ontological considerations.....	39
4.2 Article I: Identification of dimensions of Futures Consciousness.....	41
4.3 Article II: Application of the concept at the individual level	43
4.4 Articles III and IV: Development and revision of a psychometric scale.....	44
4.4.1 Original item selection	45
4.4.2 Final item selection and testing the structure of the original scale	46
4.4.3 Finnish and French scale validation.....	47
4.4.4 Assessing social desirability bias.....	47

4.4.5	Further development of items and testing of the revised scale	47
4.5	Article V: Applying the psychometric scale in a mixed-method research design.....	48
5	Results – from definition to measurement and application.....	51
5.1	The five dimensions of Futures Consciousness	51
5.2	Futures Consciousness at the individual level	55
5.2.1	Time perspective.....	56
5.2.2	Agency beliefs.....	56
5.2.3	Openness to alternatives.....	57
5.2.4	Systems perception.....	59
5.2.5	Concern for others	59
5.3	The Futures Consciousness Psychometric Scale.....	60
5.3.1	Selection of the first set of scale items	60
5.3.2	Identification of a 20-item original scale.....	60
5.3.3	Validation of the original scale.....	63
5.3.4	Finnish and French FC Scales	64
5.3.5	Assessment of Social Desirability Bias.....	65
5.3.6	Validation of the revised 20-item FC Scale.....	65
5.4	Using the FC Scale in a mixed-method research design	68
5.4.1	Clustering the participants.....	68
5.4.2	Futures Consciousness profiles	69
5.4.3	Interview analysis.....	70
5.5	Reflection of the results: definition of Futures Consciousness as an anticipatory capacity	72
5.5.1	Futures Consciousness as a capacity of an individual ...	72
5.5.2	Futures Consciousness as a generic human anticipatory capacity.....	73
6	Discussion	76
6.1	Contribution to (futures) research.....	76
6.1.1	Anticipation and futures capacities	77
6.1.2	Futures education and foresight practise.....	78
6.1.3	Understanding motivations for change	79
6.2	Limitations of the FC approach.....	80
6.2.1	Modelling and measurement	81
6.2.2	Bias and normativity of the FC concept.....	82
6.3	Directions for further research.....	83
6.3.1	Development of the FC concept and scale.....	83
6.3.2	Further study on Futures Consciousness and future thinking in general.....	84
6.3.3	Development of FC as a capacity.....	85
7	Conclusions	86
	Abbreviations	88
	List of References	89
	Original Publications.....	101

Tables

Table 1:	Research questions, data and methods used in the articles	39
Table 2:	Definitions included in the analysis to identify dimensions of Futures Consciousness	42
Table 3:	Validated scales included in the first test.....	45
Table 4:	Scales used to test for convergent and concurrent validity of the Futures Consciousness Scale	46
Table 5:	Number of elite members that participated in the study by background	48
Table 6:	Interview questions for the Finnish elite representatives.....	49
Table 7:	Consumption policies evaluated by the participants of the study	50
Table 8:	Classification of the collected characteristics	52
Table 9:	The items of the original Futures Consciousness Scale.....	62
Table 10:	The original FC scale items, the new tested items and the final revised scale items.....	66

Figures

Figure 1:	Anticipatory system.....	33
Figure 2:	The psychological concepts used to describe the five dimensions of Futures Consciousness	55
Figure 3:	The results of the confirmatory factorial analysis of the original 20-item five-factor model.....	64
Figure 4:	The results of the confirmatory factorial analysis of the revised 20-item five-factor model.....	67
Figure 5:	Acceptability of enabling (E), informative (I) and disabling (D) consumption policies by respondent groups	68
Figure 6:	Futures Consciousness scores of the three respondent groups	69
Figure 7:	Relationships between the five dimensions of Futures Consciousness.....	75

List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

- I Ahvenharju, S., Minkkinen, M., & Lalot, F. The five dimensions of Futures Consciousness. *Futures, the journal of policy, planning and futures studies*, 2018; 104: 1–13.
- II Ahvenharju, S., Lalot, F., Minkkinen, M., & Quiamzade, A. Individual futures consciousness: Psychology behind the five-dimensional Futures Consciousness Scale *Futures, the journal of policy, planning and futures studies* 2021; 128: 102708–.
- III Lalot, F., Ahvenharju, S., Minkkinen, M., & Wensing, E. Aware of the future? Development and validation of the Futures Consciousness Scale. *European Journal of Psychological Assessment*, 2020; 36(5): 874–888.
- IV Lalot, F., Ahvenharju, S., & Minkkinen, M. Aware of the Future? Adaptation and Refinement of the Futures Consciousness Scale. *Psychological Test Adaptation and Development*, 2021.
- V Ahvenharju, S. Acceptability of radical consumption policies – Utilising futures consciousness to understand elite preferences. *Futures, the journal of policy, planning and futures studies* 2021; 128: 102711–.

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Contributions of the author to the articles

- I Ahvenharju was the initiator of the article and the developer of the original idea of conceptualising and measuring Futures Consciousness. She led the team, which collected and analysed various definitions and discussed and developed the concept. Ahvenharju is responsible for writing approximately half of the text in the article.
- II Ahvenharju was the initiator and designer of the article and coordinator of the team, which discussed and developed the concept of futures consciousness, searched and analysed relevant psychological constructs, and discussed the various drafts and revisions of the article. Ahvenharju is responsible for writing approximately two-thirds of the text in the final article as well as for reviewing, revising and editing numerous drafts.
- III Ahvenharju participated in the team, which searched and analysed suitable scales and items for the creation of the composite scale and discussed the design and results of the statistical analysis. Ahvenharju gathered part of the data and wrote parts of the introduction and discussion of the article.
- IV Ahvenharju participated in the team, which analysed the shortcomings of the original scale, searched and developed suitable new items for the adapted scale, and discussed the results of the statistical analysis. In addition, Ahvenharju commented the text.
- V Ahvenharju was solely responsible for the entire article.

1 Introduction

“How can we dance when the world is turning? How can we sleep when our beds are burning?” The lyrics to *Beds Are Burning*, a song by Midnight Oil, keep coming back to my mind while writing this dissertation. Although the song is from 1987 and not about environmental problems¹, in the current-day world with vast forest fires, storms, pandemics, waves of extinctions and rising sea levels, the words of this hit song seem awkwardly fitting. Decades – even centuries – of pollution, exploitation of resources and crossing of planetary boundaries are turning against humanity and making us pay for our mishandling of the planet: *“The time has come, to say fair’s fair, to pay the rent now, to pay our share”*.

The reality is that we have far exceeded the limits of resilience of our planet and we are struggling to find ways to prevent further damage. Currently, four out of nine planetary boundaries have been exceeded, causing us to risk abrupt and irreversible changes in our environment (Steffen et al., 2015). The global biocapacity of our planet is being exploited at a level that would require 1,7 Earths (Global Footprint Network, 2021), when we only have one. Simultaneously, the pressure we put on the planet is disturbingly unequal: if everyone on the planet lived like an average US resident, we would need five planets to provide our standard of living, whereas if we all lived like an average Indian resident, the resources of this planet would suffice (Global Footprint Network, 2021). Hence, when trying to prevent further damage, we are faced with the dilemma of how to make planetary ends meet. This dilemma is depicted in a recent study: there is no country in the world that could provide sufficient health and welfare to its inhabitants without simultaneously crossing a number of biophysical boundaries per capita (O’Neill, Fanning, Lamb, & Steinberger, 2018).

This future – the one that we are living in now – was not a wild card or a black swan scenario. Many of the current megatrends have strengthened over decades. Weak signals were noticed by a growing number of scientists and activists since the

¹ The lyrics of the song refer to the Aboriginal rights in Australia and it was released a year before Australia’s bicentenary celebrations in 1988 of the arrival of the first British fleet to the continent.

1960s. Yet their voices were not heard, and the world was more occupied with current problems than looking ahead. Still today, decisive action has been slow. Why? As a futures researcher, one starts to look for answers in the way we, as collectives and individuals, imagine, manage, manipulate or use futures. Our thoughts and assumptions about the future influence the decisions we make today, and, in turn, our decisions influence how the future turns out to be (Bell, 2003, p. 82). How could that process be developed so that we would make better decisions, and consequently, better futures?

1.1 Faults in our futures

Research on individuals' images of the future, especially among youth, has identified that our future images are strongly influenced by current societal conditions and current discourses and imaginaries. Typically, these images have internal contradictions, lack imagination and true alternatives to the present, and emphasise fearful dystopian possibilities instead of positive images. (See e.g. Angheloiu, Sheldrick, & Tennant, 2020; Kaboli & Tapio, 2018; Rubin, 2013; Ono, 2003; Rubin, 1998; Hicks, 1996).

Similarly, the images of the future that dominate public discourse or that are held by organisations as results of various planning or foresight processes have been criticised for lacking in creativity, visions or being biased and partial by many futures researchers. Polak (1973), who theorised that the faith of societies depended on its images of the future, was deeply concerned of the "silent death of our visions". On Polak's footsteps, Ogilvy shares this concern four decades later and calls for the restoration of the sense of possibility and optimism, while being honest of the real dangers we may be heading towards (Ogilvy, 2011). Furthermore, Inayatullah warns against 'used' futures, when images of the future are not ours, but copied from someone else (Inayatullah, 2008). With the call to 'decolonise' futures, Dator (2019, p. 189) questions the futures of the privileged and asks to hear the images of the future of marginalised voices. Sardar has pointed out how images of the future are being 'colonised' by Western images and thinkers (1993; see also Inayatullah, 1993). Adam and Groves (2007) claim that by considering the future as 'empty', the industrial capitalist society has created images of the future that have forgotten those who will actually live in them. Miller, Poli and Rossel (2018) focus their critique on the closedness of potential futures and how truly novel aspects are rarely produced in futures processes.

One response to these concerns has been to improve the methods used in foresight processes (see e.g. Balcom Raleigh & Heinonen, 2019; Heinonen & Hiltunen, 2012; Wilkinson, 2009; Bishop, Hines, & Collins, 2007) or develop new methods to tackle the deficiencies of the old ones, such as the Causal Layered

Analysis (Inayatullah, 2004), Three Horizons (Sharpe, Hodgson, Leicester, Lyon, & Fazey, 2016) or Futures Literacy Labs (Miller, R., 2015). Another approach is to look at the capabilities and capacities of the actors involved in these futures processes.

1.2 The future challenges our (beautiful) minds

As the world has become more complex, our minds are ever more challenged in understanding the potentials and possibilities of future developments. These challenges are both internal and external in nature.

The internal workings of our minds utilise mental models and frames of thinking that are vulnerable to bias. For example, we are more likely to postpone undesirable negative consequences, even if they may be far larger in the future than the discomfort we would face today in order to avoid them. This tendency for delayed discounting (Matta, Gonçalves, & Bizarro, 2012) results in decisions that may postpone efficient action in the face of a future threat, such as climate change in previous decades. Another bias, known as existence bias (Eidelman, Crandall, & Pattershall, 2009), makes us prefer familiar options over new alternatives, even when we consider the new alternatives better. The efforts required to achieve improvements cause an inconvenience that hinders us from taking action. This bias, something that has quite likely been truly useful for humans over the ages, inhibits us from undertaking fast reforms in a short period of time.

There are also external conditions that challenge our minds when considering futures. Firstly, our capacity to imagine futures is influenced by our socio-cultural conditions (Appadurai, 2013), which make some options seem more attainable, acceptable or feasible than others. For example, our wealth and position in society make different types of personal futures seem more likely. Secondly, our cognitive capacity may be reduced due to various circumstances (Mullainathan & Shafir, 2013). For example, scarcity, in terms of poverty or some other basic necessity, influences our capacity to look ahead into the future. Thirdly, the increasing complexity of our environment hinders our ability to comprehend the consequences of different actions. For example, as consumers, we can be geographically or culturally distanced and/or disconnected from producers due to multiple agents facilitating the chain of interaction (Princen, 2002). As a result of this distancing and lack of feedback, we are blind to the consequences of our actions, and hence, more likely to become free riders.

To overcome these challenges, we should understand the ways in which we see ourselves and our surroundings – and our futures – and how we can develop and challenge our minds, so that we may better navigate towards the future and make more future-oriented decisions that respect our fellow humans and our planet. Since

we, as humans, are perfectly capable of getting rid of harmful habits and changing our beliefs, could we also become more *conscious* of the future?

1.3 Aims and structure of this dissertation

In order to develop our future consciousness, we first need to define what it is and how it could be studied. The aim of this dissertation is to develop a conceptualisation of Futures Consciousness that provides a description of a human capacity that would allow us to understand, anticipate, prepare for and embrace the future. Furthermore, the aim is to develop an operationalisation of the concept that permits its measurement so that the existence and development of the phenomenon can be studied in broader numbers and at a more general level in different contexts and cultures. To summarise, this dissertation aims to respond to the following research question: how can we observe, define and measure Futures Consciousness as a human capacity?

While this dissertation aims to contribute to the field of futures research, in order to respond to the research question, the work reported here draws on academic research from two disciplines: futures research and social and personality psychology. The contents of this dissertation are organised as follows: chapter 2 provides a more detailed description of the aims and research questions of this study and, based on said questions, reviews the existing research related to future consciousness, namely future capabilities and capacities. Chapter 3 explores the theoretical basis for the concept of Futures Consciousness: the relevance of images of the future as a source of action, the anticipatory processes that produce and reflect future projections, and the way human capacities influence these processes. Chapter 4 reviews the methods used in this study, which vary from interdisciplinary team research to tools for processing and analysing qualitative and quantitative data. Chapter 5 provides an overview of the results presented in the articles and summarises them in terms of the theoretical framework presented in chapter 3. Chapter 6 discusses the findings made in this dissertation, including their practical applications, limitations and contribution to futures research. Chapter 7 concludes the study. The goal in the writing of this summary has been to communicate the results of this work in a style that will enable readers with less experience in psychological research to apply and utilise the concepts and tools presented here.

1.4 Disclaimer concerning the author's bias

For transparency, the interests of the author of this research should be made explicit to the furthest extent possible. The following are some of the personal assumptions and values that have guided my work:

- We should try to improve and influence how the future turns out also as scientists. The task of a scientist is not only to reveal the truth and observe everything from the sidelines; we are part of the world, part of the topics we study, and we should try to find out how we can make the world a better place.
- As humans, we can influence the future, as the future is neither predetermined nor guided from above. It is what the people of this planet will make it to be.
- Studying individuals is as important as studying larger entities and systems. There is no point in contrasting individuals against collectives or parts versus the whole; both are important. To quote my supervisor: "Agent is not everything, but without an agent there is nothing."
- It is the obligation of the people living in the present to guard the rights and interests of future generations.

2 Futures ‘something’ – studying future capabilities and capacities

When much of the focus in futures research has been on possible, probable and preferable contents of the future, the *ways in which humans interact with the future* have garnered less attention. The importance of individual attitudes and perspectives towards the future has certainly been noted, i.e. that humans as well as larger systems such as organisations have some kind of capacity or competence for future thinking is a central idea in futures research (see e.g. Dator, 2019, p. 11; Inayatullah, 2008; Godet, 2001). For example, one of the key assumptions of Bell is that futures thinking is essential for human action and that capacity can be developed and improved (Bell, 2003, p. 144).

However, the conceptual and methodological development of this future capacity have been scattered. This can be seen in the terminology: a multitude of names exist for the phenomenon of individual capacity or the activity of engaging with the future. These include future thinking (Inayatullah, 2008), future orientation (Nováky, Hideg, & Kappéter, 1994), anticipation (Poli, 2010), foresight (Amsteus, 2008), future awareness (Valerio, 2019), future consciousness (Lombardo, 2007), futures literacy (Miller, R. & Sandford, 2018), projectivity (Mische, 2009), prospection (Seligman, Railton, Baumeister, & Sripada, 2013), and prospective attitude (Godet & Roubelat, 1996), just to name a few. Yet there is a lack of conceptually solid and commonly used definitions for many of them, not to mention any statistically established methods for their empirical study (van der Laan & Erwee, 2012). This dissertation aims to fill this gap. In the next section, the aims of the research are presented in more detail, while the subsequent section provides an overview of the existing research on future “somethings”.

2.1 Aiming for conceptualisation and operationalisation

As stated in Chapter 1, the aim of this study is to contribute to the theoretical and empirical research on future capacities by addressing the following research question: **how can we observe, define and measure Futures Consciousness as a human capacity?**

In order to define and measure a concept that is not concrete and visible, theoretical conceptualisation and operationalisation are required. One may ponder the relevance of conceptualising and, in particular, operationalising human anticipatory capacity. Such capacity must be complex, and hence any measurements are unlikely to do justice to that complexity. However, the advantage of conceptualisation and operationalisation is that they permit the empirical study of the phenomenon. They allow us to observe actual experience and study its presence as well as significance, consequences or connections to other phenomena and, furthermore, the potential development of the phenomenon. What may be lost in simplifying complexity can be compensated with the possibility of learning more through empirical findings.

There are several ways to conduct empirical studies, which is why this dissertation aims to *conceptualise* human anticipatory capacity in such a way that will permit various approaches. Furthermore, it aims to *operationalise* the concept to enable the measurement of individual-level capacity with a simple test, a psychometric scale. Psychometric scales possess several advantages: statistically validated psychometric scales allow for studies with large numbers of participants and enable statistical comparisons between populations, they are not dependent on any contextual settings, and the person carrying out the study could not influence the results. They can be used for research as well as for educational purposes. Moreover, they are anonymous and easy to respond to, which is appealing to most participants.

In light of the discussion above, the stated research question can be further divided into the following four subquestions²:

1. How can we define Futures Consciousness in a short and concise manner to enable empirical research approaches to the topic?
2. How can we use psychological concepts to describe Futures Consciousness among individuals?
3. How can we measure Futures Consciousness among individuals with a psychometric scale?
4. How can we apply this new concept and scale of Futures Consciousness in empirical research?

Moreover, why use the term Futures Consciousness? There are several reasons for this choice. First, when we consider the numerous studies in psychology that will be discussed in the coming section, Futures Consciousness is a term that has not already been used in that field. Second, futures in plural refers to the possibility of multiple

² See Table 1 in Chapter 4 for how these research questions are linked to the five articles presented in this dissertation.

alternative futures rather than just one. Third, consciousness as a term refers to something broader than pure thought or calculation and can include various emotions, motivations and values. Fourth, Futures Consciousness as a term suggests something that is inherent to individuals and not learned, which is also the way how the concept is defined. Fifth, the concept of consciousness presented here is developed to describe differences between individuals, in reference to the concept of self-consciousness in psychology. Some alternative terms to the one chosen here include futures awareness, futures conscience and anticipatory capacities. Futures Consciousness, however, is more suitable, since it encompasses more complexity than *awareness*, is less confusing than *conscience*, and better describes human differences than *anticipatory capacities*, which could be understood as a reference to neurological and cognitive processes.

As a final note, it should be emphasised that the use of the term *consciousness* in this context does not refer to the way consciousness is studied in neuropsychology or cognitive science. Despite this, the way in which famed neuroscientist Damasio defines consciousness is quite fitting when we considered how Futures Consciousness is presented in this research:

At its simplest and most basic level, consciousness lets us recognize an irresistible urge to stay alive and develop a concern for the self. At its most complex and elaborate level, consciousness helps us develop a concern for other selves and improve the art of life. (Damasio, 1999, p. 5)

2.2 Existing approaches to future capabilities and capacities

To provide an overview of the current research, the following sections review existing studies and concepts concerning future capabilities and capacities to discover if and how they have been conceptualised and operationalised.

As is often the case with futures research, the study of how humans interact with the future can also present a multidisciplinary challenge. How one chooses to approach the topic – as a sociological phenomenon of projectivity (Mische, 2009), as a question of available capacities for future aspirations (Appadurai, 2013), as cognitive schemes of agents in foresight systems (Dufva & Ahlqvist, 2015), as managerial attitudes towards the future (Godet, 2001), as a capacity for episodic future thinking (Szpunar, 2010), as a set of 21st century skills (Pouru-Mikkola & Wilenius, 2021), or as a revival of optimistic and utopian thinking about the future (Ogilvy, 2011) – is a question of scope and choice. My interest here lies in futures 'something' as psycho-social capacities of individuals that influence the attitudes and ways in which we think about the future.

The following sections present a review of different concepts, developed mainly in the fields of psychology and futures research. This review focuses especially on the definitions and potential measurements that have been developed in these fields.

2.2.1 Future orientation and time perspective

The terms future orientation and time perspective are widely used in the field of psychology along with a number of other similar concepts. Plenty of research has been done on these both concepts (see e.g. Kostić & Chadee, 2017; Seginer, 2009, for review), and there is a wide variety of different approaches, the most relevant of which I will describe here.

Seginer (2009, p. 15) defines future orientation as a three-dimensional model consisting of motivational, cognitive and behavioural components. The motivational component refers to the question what motivates individuals to think about the future, hence focusing on the *value* of future events, *expectance* of successful outcomes and sense of *control* over the realisation of the outcomes. The cognitive component describes the way individuals relate to the future, whether they approach it with *hope* or *fear*. And the third component, behavioural, refers to the type of behaviour an individual adopts when dealing with issues concerning the future. The main aspects here are the *exploration* of future options by gathering advice and information and *commitment* to a specific choice of action. Seginer has studied future orientation among youth using the three-dimensional model in several studies mainly based on mixed methods using qualitative analysis of future narratives and interviews as well as survey items (see e.g. Seginer & Mahajna, 2018; Seginer & Lilach, 2004). Currently, there is no commonly used psychometric scale to measure future orientation. In her study, Beal (2011) tested a future orientation model based on Tromsdorff's work (1983), but it did not result in conceptually clear and distinct dimensions of future orientation that could be captured with a single scale.

Another approach to future thinking developed in psychology is future time perspective (de Volder & Lens, 1982). It consists of two main characteristics: *extent*, how far into the future an individual sets their goals, and *content*, what kinds of things does an individual consider when thinking about the future. Furthermore, future events are considered as the main source of motivation for individual choices and actions. A coding system has been developed to analyse the future time perspective from qualitative data (Nuttin & Lens, 1985), while several different methods have been used to measure extent.

In addition to the broader conceptualisations above, two dominant approaches have been used to describe individuals' aptitude to think about the future as dispositional styles or individual differences: the *future time orientation* and *consideration of future consequences*. The future time orientation includes five

different orientations regarding how periods of time may dominate individuals' thinking: past-negative, past-positive, present-hedonism, present-fatalism, and future (Zimbardo, P. G. & Boyd, 1999). These orientations are like cognitive biases that cause the overemphasis of one time period over the others. The Zimbardo Time Perspective Inventory has been developed to measure this disposition. The Consideration of Future Consequences (CFC) Scale, on the other hand, is a one-dimensional construct that describes individual differences in weighing potential immediate and distant outcomes of current decisions and whether these outcomes influence their current behaviour (Strathman, Gleicher, Boninger, & Edwards, 1994). Although much narrower as a concept than the previous ones, CFC interestingly includes an aspect of systemic thinking, which distinguishes it from the others.

In addition to psychologists, some futurists have also used the term *future orientation*. Nováky et al. have defined this as “the characteristic and the capacity, unique to human beings, which enable thinking to be regulated by the past and present, but also to reflect continuously assumptions and expectations regarding the future” (Nováky et al., 1994). According to their proposal, future orientation consists of the following components: thinking about the future, applying social techniques to limit its uncertainty, actions taken in the interest of the future, and expectations about the future (Hideg & Nováky, 2010). To study future orientation, Nováky et al. developed a questionnaire that included questions about attitudes regarding the future, but also very concrete expectations for the future, such as financial status over a certain period of time.

2.2.2 Anticipation and futures literacy

Anticipation has become an increasingly popular approach to future thinking and orientation among futures researchers in the last decade. Anticipation has been defined as the use of the future in the present, a process in which expectations of potential future events guide decisions taken today (Poli, 2014b). Miller, Poli and Rossel (2018) describe explicit anticipation as a “combination of capacities that allow human beings to consider and evaluate the present in light of the way they imagine the future.”

Building on the ideas of anticipation, futures literacy has been referred to as the capacity to use the future. Using the future in the present can happen in three ways: optimisation, contingency and novelty. Optimisation means assuming the future as a continuation of the present, contingency refers to the future as surprises to be planned for and adapted to, and novelty presents the future as something that can expand our understanding of the present (Miller, R. et al., 2018). When compared with anticipation, futures literacy more clearly represents a skill or capability to

analyse and create futures processes where anticipatory knowledge is created (Miller, R., 2015). Futures literacy makes a person more able to ask new questions, improvise, sense and make-sense of novelty and appreciate temporality (Miller, R. & Sandford, 2018). According to Rhisiart, Miller and Brooks (2015), there are three levels to futures literacy. The first level is *awareness*, meaning that individuals become more aware of temporalities and explicit of their values and expectations. At the second level, *discovery*, individuals engage in 'rigorous imagining' to systematically push the boundaries of what is possible. And at the third level, *choice*, the imagined possibilities are used to bring insight to the decisions made in the present. At present, there is no established measurement for the development of futures literacy.

In the borderline between futures education and futures literacy, Pouri-Mikkola and Wilenius (2021) have proposed a framework for transformative futures learning that includes three dimensions: cognitive, motivational and active dimension. The cognitive dimension includes knowledge of future thinking and its basic principles. The motivational dimension refers to an individual's reflection of their own relationship with the future, and the active dimension is a set of concrete skills that enable the empowerment of the individual. Currently, no suggestions have been presented on how to measure the process of transformative learning.

Unrelated to the conceptual development of anticipation and futures literacy, researchers in cognitive psychology (Geden et al., 2019) have developed an anticipatory thinking assessment (ANTA) to measure anticipatory thinking in three different forms: prospective branching, backcasting, and retrospective branching. Prospective branching refers to the anticipation of future states and indicators that could lead to those states. Backcasting means looking back from a certain future state and identifying indicators that could lead to that specific future state. Retrospective branching refers to the identification of past systems states and their role in producing the present state. All these forms of thinking require the recognition of aspects based on current experience, the extrapolation from current to a different state, and the construction of a mental model of the system in order to generate a variety of possible future or past states that are plausible and useful for the matter at hand. Considering such a vast plethora of options thoroughly is not possible, hence an anticipatory thinker utilises creativity to recognise and choose the relevant options (Geden et al., 2019). In the ANTA measure, participants are asked to generate possible futures, and their responses are coded according to the four qualities of anticipatory thinking: uniqueness, specificity, remoteness and diversity.

2.2.3 Foresight thinking

In the field of futures research, future thinking abilities are often termed as foresight capacities of individuals or organisations, especially in the context of planning and management. Foresight is often considered as a sort of predictive thinking. According to Tsoukas and Shepherd (2004), foresight is the ability to see beyond seeming perplexity, to identify developments before they become trends, to recognise patterns before they emerge, and to spot relevant features of social currents that potentially shape the direction of future circumstances. Slaughter (1995) defines the three general capacities of foresight as the capacity to detect hazards, assess consequences of actions, and envision desired futures.

The Foresight Competency Model (Hines, Gary, Daheim, & van der Laan, 2017) was developed in cooperation with 23 practising futurists from four continents. It defines the six main competencies of a professional futurists: framing, scanning, futuring, visioning, designing, and adopting. These competencies are based on the various tasks that are carried out in the foresight process, which is defined as a rational and intuitive mental process used to develop images of the future. Hence, these competencies draw on managerial and facilitatory skills that are required for a successful process. The authors define competency as “any individual characteristic that distinguishes superior from average performance”, and the listed competencies consist of skills, knowledge and performance supporting attributes (Hines et al., 2017). Currently, there is no commonly used method to assess foresight competency.

However, four other measures have been developed with various approaches to foresight capacities. The Foresight Styles Assessment was originally developed by Dian (2009), and the six proposed styles were later statistically analysed by Gary (2009). As a result of the analysis, four styles were confirmed: framer, adapter, tester, and reactor. The final statistically validated version of the assessment included 26 items; however, the content and discriminant validity were not considered convincing. Further research on the assessment validated three of the styles: framer, adapter, and tester, and called for further development of the scale (van der Laan & Erwee, 2012).

Another tool, Self-Efficacy Towards Postulated Futures, was developed by Park (2018) to measure the impacts of foresight activities on individuals' foresight abilities. The concept includes four abilities: the ability to shape new meanings, to challenge the status quo, to make a decision and implement it, as well as to learn new things through co-operation. The scale includes 20 items, but the validity of the scale requires further research.

The third measure, Managerial Foresight Thinking, was developed by Amsteus (2011; 2008). The managerial foresight concept includes two dimensions: *time*, as an extension from present to past and future, and *analysis*, as done when planning and learning from experience. The final scale includes 12 items. The fourth method

was developed by Hayward (2005) to study the Individual and Social Foresight, which includes three aspects: the development of self, moral judgment, and values. These aspects are measured with a 25-question survey that includes both structured and open questions.

Although the focus here has been on individual-level approaches, one of the few measures developed for organisations is Rohrbeck's (2011) Foresight Maturity Model. It looks at the capabilities of an organisation in five dimensions: the ways the organisation uses information, how sophisticated methods are used for interpreting information, how people and networks are utilised in foresight, how the organisation utilises gathered information, and how its corporate culture supports foresight effort. Rohrbeck also developed the concept of Future Preparedness (Rohrbeck, René & Kum, 2018) to measure the relative level of corporate foresight. This is assessed by comparing the need for corporate foresight in the specific field of activity and the maturity of the corporate foresight practices of the company in question.

2.2.4 Future consciousness

Future consciousness is yet another term used mainly in the futures research field to express the human capacity or capability to comprehend the future (see e.g. Malaska, 2017). Toffler claims his book is “designed to increase the future consciousness of its reader” (Toffler, 1970, p. 2). Polak proposes that one of the main objectives of futures research is to raise future consciousness (Polak, 1971). According to Bell, futurists “attempt to promote greater futures consciousness among individuals throughout society and to futurize the thinking of other people, including professionals” (Bell, 2003, p. 75).

However, existing work on the exact concept of future consciousness is scarce. There are few short definitions by authors who have not expanded further on the topic and then few researchers who have studied it in more detail. Rubin (2002) defines future consciousness as “an active and action-oriented perspective on the future, present and past and the relations between these. [It is] an internalized form of the development of thinking [and] a specific effort to form a conception about the meanings and consequences of issues and our daily actions.” Sharpe, Hodgson, Leicester, Lyon, & Fazey (2016) in turn, define future consciousness as a “shared capacity” and as “awareness of the future potential of the present moment”, which can be achieved through the explicit use of the three modes of anticipatory awareness, also used in their Three Horizons method: the short-term ‘managerial’, mid-term ‘entrepreneurial’ and long-term ‘visionary’ mode.

Sande takes a step further in his article “Future Consciousness” (1972), which he wrote when he worked together with Galtung on the Ten Nation Study. Sande

defines future consciousness as having six dimensions: 1) length, as to how far individuals plan and foresee the future; 2) level of interest, referring to the individual's concerns about the future at the personal, national or world level; 3) optimism, referring to expectations of positive or negative things taking place in the future; 4) influence, referring to the individual's sense of influence or powerlessness; 5) expectations, as to the future events that individuals expect to happen; and 6) values, represented in the individuals' desired futures. Sande studied these dimensions from a set of survey questions, but these questions have not been developed into a statistically validated measure of individual orientation.

The only author who has done continuous work on the conceptual development of future consciousness is Lombardo (see e.g. 2016; 2008; 2007). Lombardo defines future consciousness as “the total integrative set of psychological abilities, processes, and experiences humans use in understanding and dealing with the future” (Lombardo 2008, p. 6). He describes future consciousness as a multifaceted psychological capacity that involves several psychological processes: perception and behaviour; emotion and motivation; learning, memory, and understanding; anticipation, thinking, and planning; intuition and imagination; self-identity; and social interaction (Lombardo, 2016). For Lombardo, future consciousness is built upon our innate perception of time, persistence and change, and while it varies among individuals, it can develop over time. In addition to the list of psychological processes involved in future consciousness, Lombardo provides a list of thirteen character virtues of heightened future consciousness (see article I for a more detailed description). Lombardo strongly emphasizes the holistic nature of future consciousness as the main feature of wisdom and its central role as the most distinctive capacity of humans. However, despite his extensive work on future consciousness, Lombardo has obviously not aimed to develop a definition of future consciousness that would have been applicable for empirical purposes or served as a suitable basis for a measurement tool.

2.3 Filling the gap

As can be seen from the overview presented above, a variety of approaches have been developed to define the future capacities and capabilities of individuals. However, many gaps remain.

Regarding the psychological approach to future orientation, it focuses on images of one's personal future, such as their career, and falls short of a broader approach to images of the future that also reflect the environment of each individual. The futurist approach to future orientation, on the other hand, focuses more on action than capacities. Neither of these approaches has produced a generic measure that is contextually independent. For the time perspective and consideration of future

consequences, validated measures exist, but they focus solely on time and sequence, when one would expect future capacities to be something more than only that.

Considering anticipation and futures literacy, no more detailed description in terms of capabilities currently exists. Furthermore, futures literacy has been described as a skill that is learned, as knowledge of future processes and the different ways in which the future is used. Hence, it does not address the human capabilities that would be required or used in the process of learning those skills. Interestingly, the ANTA measure of anticipatory thinking does address the human capability to see alternative futures, but the measure has been developed mainly for the use of analysts and experts and not for general use, and it requires the qualitative coding of responses.

In terms of foresight thinking, the Foresight Competency Model mainly addresses different tasks of a foresight professional, but it does not define the individual capabilities required to carry out those tasks. Similarly, the Foresight Styles Assessment defines different styles, but does not identify capabilities. In addition, the validity of the Foresight Styles Assessment requires further testing and development, and the same applies to the Self-Efficacy Towards Postulated Futures measure. The Managerial Foresight Tool focuses on a very narrow conception of a four-year time frame and the level of detail in managerial planning, whereas the Individual and Social Foresight method addresses quite broad topics that are difficult to define as capacities or capabilities. It also requires a notable amount of qualitative work, which hinders its practical use. The Foresight Maturity Model of organisations includes very specific organisational aspects that cannot be generalised to human capabilities in general.

Lastly, work on future consciousness is notably scarcer than on the previous concepts. Only two researchers have attempted to define it at a more concrete level, but many of the identified dimensions in both of the concepts are difficult to interpret as capacities or capabilities: some are features of their future images or philosophical approaches to life. In conclusion, there is a research gap and a need to develop a model of futures ‘something’ as a human capacity for empirical research purposes. And, in this case, this futures ‘something’ will be called Futures Consciousness.

3 Theoretical framework – from images of the future to anticipatory capacities

The relevance of understanding human interaction with the future lies largely with its impacts on our present action. The way we understand the future influences the way we understand the present, especially the choices we make and decisions we take. While there are similarities in the ways in which humans operate and process information, there are also notable differences in how we understand and interpret information and what kinds of conclusions we draw based on the knowledge at hand. In this section, the relevance and theoretical basis of Futures Consciousness as an anticipatory capacity is discussed based on the theories of images of the future and anticipation.

3.1 The images of the future as a driver of social and behavioural change

‘Image of the future’ is a central concept in the sociological understanding of societal change, especially among futures researchers. In this conception, the future is seen as the cause for action in the present: we either try to adapt to what we see as being ahead of us, or we try to shape the future into something we want (Bell, 2003, p. 82). De Jouvenel calls these fictions situated in the future as “causes of future realities” (de Jouvenel, 1967, p. 25).

Polak claims images of the future cause the rise and fall of cultures (1973), since they provide the motivation for transformation and progress through shared images of cultural importance, god, the cosmos, social structures, and so forth. For Polak, images of the future are results of conscious and responsible choices between alternative images (1973, p. 13), strongly influenced by our attitudes, especially in terms of optimism and pessimism. By making a distinction between *essence* and *influence* categories – the former referring to the changeability of events and the latter to the possibility of human intervention – Polak identifies typical differences between societal images of the future, which vary from fatalistic survival to omnipotent utopias (1973, p. 17).

Bell and Mau, who studied the role of images of the future during the political transitions in the Caribbean in the middle of the 20th century, suggest in their theory of social change that images of the future are based on our beliefs about the past and the present, about causes and effects as well as our values. The images of the future,

in turn, shape decision-making processes, which result in individual and collective action towards the emerging future (Bell & Mau, 1971, p. 21). They propose the following definition for images of the future:

An image of the future is an expectation about the state of things to come at some future time. We may think most usefully of such expectations as a range of differentially probable possibilities rather than as a single point on a continuum. Images of the future may vary in many ways. For example, they are specific to different aspects of reality and pertinent to different levels of abstraction. (Bell & Mau, 1971, p. 23.)

Anita Rubin, who has studied images of the future among Finnish youth, focuses more on the individual-level experience of future images. She emphasises their ordinariness among all individuals and both conscious and unconscious impacts on our behaviour:

An image of the future is a mental construction dealing with possible future states. It is composed of a mixture of conceptions, beliefs and desires, as well as observations and knowledge about the present. This affects a person's choices both consciously and unconsciously and is derived from both reality and from imagination. Ultimately, it steers one's decision-making and actions. (Rubin, 1998, p. 82.)

An essential aspect emphasised by Rubin as well as others (see e.g. Soini-Salomaa & Seitamaa-Hakkarainen, 2012; Ono, 2003; Bell & Mau, 1971) is the dual nature of the effects of the images of the future: the quality of our decisions today influence the quality of the future to come, yet they depend on the quality of our present images of the future.

While in the futures field images of the future have been a prevailing line of study, similar aspects have also been studied using other names and terminology in other disciplines. For example, in current sociological studies, the concept of social imaginaries shares many similarities with future images, although they are not temporally oriented only towards the future. Taylor provides the following definition:

By social imaginary, I mean something much broader and deeper than the intellectual schemes people may entertain when they think about reality in a disengaged mode. I am thinking, rather, of the ways people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations. (Taylor, 2004, p. 23.)

Mische discusses the notion of projectivity in the context of social imaginaries and how they inform social practices and structures (Mische, 2009). Projectivity refers to the process where an action is considered the result of a choice made by an actor who has reviewed multiple future possibilities through creative and willful foresight. Interestingly, Mische brings attention to the narrative nature of these future images or scenarios and to their cultural, institutional and relational groundings. The concept of projectivity relies on the sociological theory of action (Schutz, 1967), which claims that future actions are motivated by an “in-order-to” structure that shapes an action from within. In other words, actions are projects that reflect our future expectations in that moment.

In science and technology studies, the concept of socio-technical imaginaries resembles the way in which Polak, Bell and Mau understood the impact of images of the future. Jasanoff and Kim (2015) define socio-technical imaginaries as collective and institutionalised visions of desirable futures that have been influenced by changes in social systems that will result from advances in science and technology. Rather than these imaginaries being personally held, they are the driving forces of societies and other larger groups of people.

In the field of psychology today, images of the future are often studied under the term ‘future orientation’ (see Seginer, 2009 for an overview). However, earlier psychologists used other names: for example, Israeli³ (1930) called them ‘future cues’ and Lewin the ‘psychological future’.

The picture presented by this “psychological future” seldom corresponds to what actually happens later...But, regardless of whether the individual’s picture of the future is correct or incorrect at a given time, this picture deeply affects the mood and the action of the individual at that time (Lewin, 1942, p. 48).

At the turn of the 1960s, social psychologist Cantril (1965) conducted a survey in 14 nations, studying people’s concerns, hopes and fears at both the personal and national levels. His approach to the images of the future as ‘hopes and fears’ has become a typical approach, especially in psychology (see e.g. Fonseca, da Silva, Paixão, Crespo, & Relvas, 2020; Zhang, Chen, Yu, Wang, & Nurmi, 2015; Nurmi, Poole, & Seginer, 1995). Interestingly, Seginer (2009, p. 10) claims that although the ‘hopes and fears’ approach has been widely adopted in psychology, Cantril’s other aspect of studying both the personal and national-level future together – a typical distinction in futures research – has not been commonly used in psychology.

³ As an anecdote of fascinating piece of research: In one of his experiments, Israeli (Israeli, 1953) studied the future images of his hypnotised research participants over various time scales from 150 years to quintillion years.

Another psychological approach that utilises the idea of future images is the ‘possible selves construct’ (Markus & Nurius, 1986), which focuses on the idea of an imagined potential future self as a source of motivation guiding present behaviour. These possible selves help individuals think about their future and options, to evaluate their current selves against possible selves, and imagine necessary actions to reach the ideal self (Cross & Markus, 1990).

In cognitive psychology, the concept of prospection is similar to the idea of imagining the future (Gilbert & Wilson, 2007). Seligman, Railton, Baumeister and Sripada (2013) describe prospection as mental navigation to explore options and assess progress based on simulations of the future. These evaluative representations of possible future states occur spontaneously and continuously and both consciously and unconsciously, and they are central in informing our decisions and explaining our behaviour.

As can be seen from above, the idea of a future image influencing present actions is common to many strands of research in the social sciences. It is important to note that these future images are generally considered as complicated and multifaceted abstract mental models or mental representations, rather than specific, concrete visual images, plans or maps. As the relevance of these future images as sources of and motivations for action and decision-making is generally accepted and agreed upon in the field of futures research, more detailed theoretical discussion on how these images are formed has recently emerged under the headline of *anticipation*.

3.2 Images of the future as part of anticipatory processes

Anticipation aims to study the anticipatory behaviour of complex systems. Many anticipatory theorists base their work on the original research of Rosen, a biologist and mathematician who, in the 1970s, described mathematically how biological systems anticipate their environment (Rosen, 1985, p. 341). Building on the work of Rosen, the sociologist Poli suggests a theory of anticipation that claims that most systems are anticipatory: it is a generic property shared by human and natural systems. Drawing on examples from economic, biological, physical, psychological and social systems, among others, he demonstrates how anticipation is a characterising feature in many of those systems (Poli, 2017).

According to Rosen, “an anticipatory system is a system containing a predictive model of itself and /or its environment, which allows it to change state at an instant in accord with the model’s predictions pertaining to a later instant” (Rosen, 1985, p. 341). In Rosen’s model, the system (S) has a predictive model of itself (M) which guides the system’s direction of development through effectors (E), as presented in **Figure 1**. An anticipatory system utilises inputs from its environment to create

predictive models of the future state of the system. These models cause the system to modify itself in order to reach its desired state. The interaction between the predictive model (M) and the system (S) can result in changes to the properties of both: the activity of the system may result in an updated predictive model, or the predictive model may alter the functioning of the system (Louie, 2010).

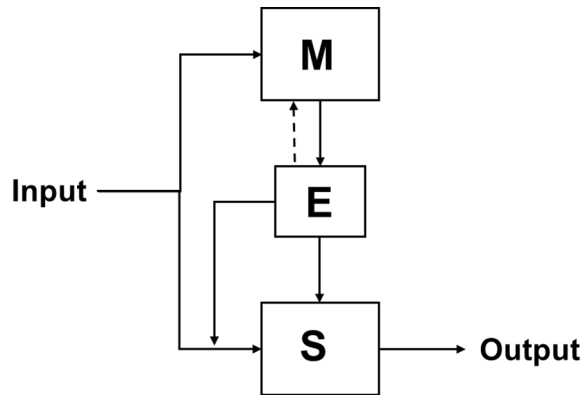


Figure 1: Anticipatory system (Rosen 1985, p.13; Louie 2010, p.26).

With regard to human anticipation, predictive models of anticipatory systems share a resemblance with the idea of images of the future, especially if we consider such an image to be a kind of mental representation, and not a detailed and specific picture or plan. Hence, anticipatory behaviour could be defined as action and learning based on producing and re-producing images of the future. These images of the future – or predictive models – can be either internal or external, depending on the system boundaries. For example, an individual may base their images of the future on external images created by their surrounding society or internal images based on their own imagination and expectations. Referring to Rosen, Poli describes human anticipatory behaviour as ‘using’ the future when making decisions in the present (Poli, 2017, p. 1). This process requires two components: a forward-looking attitude and using the result of this attitude when deciding one’s action. These anticipations enable or constrain the development of the system by shaping “what the system allows itself to do, what it considers possible, and what it deems unrealisable (Poli, 2017, p. 270).”

A central aspect of the anticipatory system is the concept of *feed-forward* (Louie, 2010). When changes in a system are based on feedback, corrective action is based on the discrepancy between the present state and ideal state. But in a feed-forward system, corrective action is based on the discrepancy between predicted outcomes and the ideal state. This description of systems with feed-forward and feedback

features can be found in psychological theories as well, such as prescient learning (Miller, G., Galanter, & Pribram, 2013, originally published in 1960), self-regulation (Carver & Scheier, 1981), and prospection.

The psychologists Seligman, Railton, Baumeister and Sripada (2013) suggest that prospection is “active selective seeking of information or exploration”, which produces prospective representations, or so called *if-then* possibilities. These prospective representations act like models guiding the actions of animals and humans. For organisms to be able to acquire these models, they need to be able to learn through so-called feed-forward/feedback loops, which include the following stages (Seligman et al. 2013):

expectation → observation → discrepancy detection → discrepancy-reducing
change in expectation → expectation ...

In other words, our expectations drive our behaviour, but when we observe the results of our behaviour, we can identify discrepancies that contrast said expectations. Consequently, we can change either our behaviour or expectations. The feed-forward/feedback model emphasises learning as a continuous series of experimentations that provide new answers and thus new questions. Seligman et al. describe this from experiments with rats in a T-maze: when they enter a point of choosing a direction, they mentally explore and assess the options ahead based on their previous experience and quickly learn not to make choices that do not reward them. Hence, they conclude that animals are more successful when they “continuously model what might lie ahead and proactively seek information, allocate mental resources, evaluate alternatives and select action (Seligman et al., 2013)”. It is important to note that Seligman et al. emphasise the importance of past experience – not as a predictor of our future behaviour – but rather as a source of information used when assessing and evaluating future options.

However, the description of a system projecting predictive models based on a feed-forward/feedback loop sounds like a simplification that suggests functional rationality. Both Poli (2017, p. 267) and Seligman et al. (2013) recognise that there are system-related qualities and differences that produce variation in the predictive models. Poli also suggests that anticipation may also be explicit or implicit: a system may be aware of its predictive models and their content or totally unaware of them. The question of how much a system can utilise external information in forming its predictive models depends on the qualities of the system, i.e. what it is able to recognise and process. According to Poli: “Whilst system may learn to expand or modify the range of information it is able to process, it remains deaf and blind to information outside its interpreting codes (Poli, 2017, p. 203).” This brings us to the question of anticipatory capacities.

3.3 Variations in the outcomes of anticipatory processes depend on differences in anticipatory capacities

Rosen suggests that while, over time, all predictive models fail to be useful for anticipation, many models have high levels of friction and stay in use, even when they have in practise become obsolete or have very small anticipatory value. Due to lacking error signals, this failure may be invisible to the system itself. Rosen used the term “senescence” to describe the discrepancy between the predictive models and actual functioning of the system itself, when the system no longer adapts to its predictive models (Rosen, Rosen, Kineman & Nadin, 2012, p. 368). From the modelling point of view, Rosen identifies several sources of possible errors in the anticipatory system: choosing wrong variables and specifications for the predictive model, failures in correspondence between the model and the system itself, selecting the wrong paradigm for the qualities of the model, the effectors being too weak to change the system’s course of development, or effectors having an impact on the wrong variables in the system. Furthermore, there is the possibility of “side effects” when the anticipatory system interacts with other anticipatory systems and the effectors have other-than-intended consequences.

Applying Rosen’s list to human anticipation, many of the identified sources of error could be analogous to failures in human judgement caused by failures in neurological or cognitive functioning. Similarly, they could describe the features of an organisation, where the organisation’s values, practices and processes produce imperfect predictive models of the organisation and its environment. Hence, these sources of potential errors could be described as qualities of the anticipatory system, or, in other words, its *anticipatory capacities*. In addition to the anticipatory capacities pertaining to the system itself, they can also be related to its environment: the networks of other actors, availability of resources, as well as environmental and technological conditions.

In terms of the anticipatory capacities of individuals, when faced with large amounts of processable information, people are not very good at making rational judgements. Rather than performing a computational evaluation of different options, people use simplifying strategies, based on different subroutines, to arrive at conclusions. These simplifying strategies, called heuristics, are very economical and usually effective, but they also lead to errors (Tversky & Kahneman, 1974). These errors, or biases, are judgements that deviate from an objective value, differ from rational choice or mathematical assessments of probability. Empirical experiments show that this is not a question of laziness or a lack of motivation in problem solving: these heuristics and biases exist even when more resources are available and incentives in place (Gilovich, Griffin, & Kahneman, 2002).

Similarly to heuristics, our attitudes influence the way people give meaning to the information they receive or the situations they are faced with. Instead of starting from the beginning with each new issue, they save cognitive energy by referring to their attitudes that provide an orientation towards the issue at hand (Hogg & Vaughan, 2018, p. 156). When new information arrives, people evaluate it and combine it with existing information they already know. Van der Pligt and Vries (van der Pligt, de Vries, Manstead, & van Harreveld, 2000) suggest that our decision-making strategies that are based on attitudes vary from intuition to the very controlled processing of information, depending on their importance. Attitudes are also strongly influenced by affect, our emotional reaction to an object, as well as beliefs (Frijda, Manstead, & Bem, 2000).

Consequently, the process of human anticipation requires various capacities that enable actors to process, reflect and evaluate information, make conclusions, and act accordingly. These capacities vary among different actors, be they individuals, organisations or other larger entities. As Rosen claims, the models embodied by anticipatory systems are unique (Rosen et al., 2012, p. 370), but so are the combinations of qualities that sustain these systems and produce the predictive models. Therefore, the anticipatory capacities are different for each individual anticipatory system. In terms of human individuals, this means that anticipatory capacities are related to personality traits, but organisations also have their typical features related to anticipation, both formal – such as planning, monitoring or assessment processes – and cognitive features, such as situation awareness or sense-making (Barbera, Jones, Korac, Saliterer, & Steccolini, 2021).

To summarise, for a human system to be able to recognise and process different kinds of information in order to produce, explore, evaluate, and update its predictive models, i.e. images of the future, it must be able to sustain certain functions. These functions are cognitive, such as memory, reflection or problem-solving. However, there are also some central qualities of the system, such as habits, beliefs, values, biases and so forth, that impact how these cognitive functions are carried out, and especially how the predictive models turn out to be. These qualities define our anticipatory capacities. The next chapters describe how the concept of Futures Consciousness attempts to capture the different dimensions of these anticipatory capacities.

4 Methodology – futures research meets psychology

This study builds on an interdisciplinary research approach combining the fields of futures research and social and personality psychology. From very early on, it became clear that addressing research questions two and three – how to apply the concept of Futures Consciousness to individuals and how to measure it – would be pointless without utilising the already abundant research on individual behaviour and the psychometric tools available in the field of psychology. The challenge was to combine these two different fields and their research traditions in a way that would be acceptable to both and beneficial for at least one discipline.

4.1 Interdisciplinary approach

Futures research is a small, transdisciplinary field of study that has its roots in utopian philosophy, military planning, and even peace studies (Bell, 2003). It became an established field of scientific study in the latter half of the 20th century, when an increasing number of tools and methods were developed for the systematic study of alternative future developments (see e.g. Popper, 2008 for an overview). The search of probable and possible futures and the identification of preferred futures have served as its main subjects of interest (Amara, 1981). In particular, the focus on the identification of preferred futures has brought normativity to the field: futurists do not just observe the unfolding of various future alternatives, they try to identify which of the alternatives would be best for the the welfare of present and future generations (Inayatullah, 2008; Bell, 2003; Masini, 1993). The ways in which these alternative futures are mapped are based on a systemic approach and different theories of societal change. The unit of interest has typically been a society, a sector of it, some field or an organisation, and studies focusing on individuals have received less attention. In the recent decade, future-oriented thinking among individuals has gained wider interest with the rise of anticipation theory (Poli, 2010).

Psychology, on the other hand, was originally a branch of philosophy that became a more established field of study in the latter half of the nineteenth century. It features a strong experimental tradition in the study of individual and social behaviour and mental processes. Today, the field of psychology encompasses a

multitude of subfields from criminal psychology to neuropsychology and to psychoanalysis, each with their own traditions. This work explores the fields of personality and social psychology, which are widely researched fields of study that focus on individual behaviour, motivation and emotion. They have a strong empirical tradition in the development and use of psychometric tools. In terms of the study of human behaviour, they provide complementary approaches. Personality psychology specialises in the definition, investigation, and assessment of individual characteristics, the patterns of their thinking, emotion and behaviour, and the dynamics that give rise to these characteristics (Haslam, Smillie & Song, 2017). Social psychology, then, focuses on how these individual characteristics, patterns of thinking, emotion and behaviour are affected by their social environment, contextual changes, and social relationships (Hogg & Vaughan, 2018). The study of an individual's future thinking and future orientation has a notable tradition in psychology (see Kostić & Chadee, 2017 for an overview), although research is scattered and weakly connected, even within psychology (Husman & Hilpert, 2017, p. 276). Within futures research, this tradition is rarely utilised⁴.

In order to utilise existing psychological research methods and data to develop the conceptualisation and operationalisation of Futures Consciousness from the futures research perspective, broad understanding of the different research traditions in both fields was required. The adoption of an interdisciplinary approach allowed collaboration across boundaries between the disciplines and the integration of knowledge, data, and concepts. The team of researchers who worked on the articles featured in this dissertation included altogether three psychologists (Fanny Lalot, Enrico Wensing, and Alain Quiamzade) and three futures researchers (Sanna Ahvenharju, Matti Minkkinen, and Titta Tapiola) over a four-year period⁵. In the first two years, the team held regular monthly meetings, which helped to create a common understanding of the topic and the different disciplines. Hence, the team could be described as an integrated research team (Bennett & Gadlin, 2012) with shared goals, the open sharing of ideas and data, established communication channels, and common file management practises, with each member providing their specific expertise. The complementary skills and knowledge of the team members enabled the scientific advances that were reported in the articles and summarised in

⁴ A simple demonstration: running a search of all articles from 'Futures – The journal for policy, planning and futures studies' available in electronic form for some central names in psychological studies on future orientation (such as Markus & Nurius, Zimbardo & Boyd, Seginer, Strathman & Joireman, Baumeister) provides only 2–7 hits per name.

⁵ All members did not take part in every phase of the project, and the participation of some varied over the years.

the ‘Results’ section of this dissertation. The efforts of the team took this dissertation far further than what would have been possible for the author alone. Furthermore, it should be noted that there was no funding available, except for the author of this dissertation. The other members of the team took part in this work purely on the basis of their scientific interest.

The methodological choices made for this dissertation stem from the different approaches needed for the conceptualisation and operationalisation of Futures Consciousness. Reflecting the interdisciplinary and exploratory approach, the study developed from theoretical elaboration to empirical observation using mixed methods: for conceptual development, qualitative literature reviews were used, whereas for operationalisation – which was done with the development of the psychometric scale – quantitative methods were necessary. Both qualitative and quantitative tools were used for further analysis. An overview of the different methods is provided in **Table 1**. The methods used in each of the articles are described in more detail in the following sections.

Table 1: Research questions (see also section 2.1), data and methods used in the articles.

ARTICLE	RQ	DATA	METHOD	DISCIPLINE
I	How to define Futures Consciousness?	Existing definitions related to future orientation, thinking or consciousness	Literature review and qualitative analysis	Futures research
II	How to use psychological concepts to describe FC?	Existing psychological constructs	Literature review	Futures research / Personality and social psychology
III + IV	How to measure Futures Consciousness among individuals?	Survey responses to selected psychometric scales	Statistical analysis: exploratory and confirmatory factorial analysis	Personality and social psychology
V	How to apply the concept in a empirical research?	Interviews and responses to Futures Consciousness Scale	Mixed methods: clustering and thematic analysis	Futures research

4.1.1 Methodological and ontological considerations

The conceptualisation and definition of Futures Consciousness as a human capacity presented in this work were strongly influenced by the assumptions and choices made during the process. The following assumptions and criteria were discussed

thoroughly and agreed by the team members to guide the approaches that were chosen. These assumptions and criteria were developed based on the comparison and combination of the psychological understanding of individual differences and developmental psychology and the futures research experience on futures education and future thinking.

- Futures Consciousness as a human capacity is something that is likely to exist, whether it can be measured or not. It may manifest itself in different ways among different people and especially in different cultures. A measurement tool that is suitable in one context may not be that in another context.
- Futures Consciousness is a capacity that an individual can have even without being taught; it is a readiness or a potential to develop competent, future-conscious behaviour. Futures Consciousness is not a skill or competence, which are something that are acquired only through learning processes.
- Futures Consciousness is not a specific aptitude or capability, i.e. a specific characteristic of selected individuals that can become activated and put into constructive use. All individuals can become future conscious, not only those with a talent for it.
- Futures Consciousness includes a mix of dispositions, or traits, in which individuals differ from one another. Some people can be more inclined to be future conscious on some dimensions and less in others.
- Futures Consciousness also represents a mix of flexible abilities affected by contextual changes. In other words, one's environment and surrounding conditions will affect how individuals' Futures Consciousness develops. It can change over time or as a result of experiences and changing contexts, but this change may be slow. This also means that it can be taught and developed over time.
- Futures Consciousness is something larger and more complex than what one psychometric measure will be able to expose. The Futures Consciousness Scale or any other psychometric measure will always be able to provide only a simplification of the phenomenon itself.
- This definition of Futures Consciousness relies on writings in futures research that have aimed to capture the central aspects of future-oriented thinking. This may have an influence on how different aspects are identified and prioritised.

The following sections provide an overview of the methods used in the different articles.

4.2 Article I: Identification of dimensions of Futures Consciousness

In the first phase of the project, a literature review covering the main journals and books within the futures research field was carried out in 2014 to find a basis for identifying potential dimensions of Futures Consciousness. Only three existing definitions of future consciousness were found: Sande (1972), Lombardo (see e.g. 2016; 2007), and Rubin (2002). Consequently, the review was extended to include definitions and descriptions of similar or related concepts, such as future orientation, projectivity, prospection, prospective attitude, anticipation and futures literacy. The emphasis was on including descriptions or lists of characteristics or features that could be understood or reworked to describe a *human capacity*. Due to the small number of fitting definitions, the list was complemented further with four lists of characteristics that describe futures studies, which in itself is a form of future thinking and could be expected to represent an expression of high Futures Consciousness. Finally, the review identified twelve suitable descriptions for further analysis (see **Table 2**).

In the following qualitative analysis, the various characteristics listed in each of the definitions were treated as single factors and clustered together with other similar characteristics to form groups that describe similar features. These groups were considered as the potential dimensions specific to Futures Consciousness. The classification of the characteristics into different groups was not a straightforward exercise and was instead reconducted iteratively several more times. In the process, the original authors and their texts were revisited for better understanding of the contents of the terms they had used. Unfortunately, in some cases further explanations were not available, e.g. for Berger's 'Basic virtues for developing a prospective attitude' (see **Table 2**).

Table 2: Definitions included in the analysis to identify the dimensions of Futures Consciousness.

I DEFINITIONS OF FUTURES CONSCIOUSNESS

Dimensions of future consciousness (Sande, 1972)

Heightened future consciousness (Lombardo & Cornish, 2010)

II DEFINITIONS OF RELATED CONCEPTS

Conceptualization of future orientation (Beal, 2011; Trommsdorff, 1983)

Basic virtues for developing a prospective attitude (Gaston Berger, quoted in Durance, 2010)

Prospective attitude (Gaston Berger, quoted in Godet & Roubelat, 1996)

Cumulative levels of futures literacy (Miller, R., 2007)

Dimensions of projectivity (Mische, 2009)

Dimensions of the scenaric stance (Ogilvy, 2011)

III DEFINITIONS OF FUTURES STUDIES

Elements of a [futures] rationale (Slaughter, Richard, 1996)

Key assumptions of futures studies (Bell, 2003)

Four laws of futures studies (Sardar, 2010)

Multiple faces of futures research (Heinonen, 2013; Heinonen & Balcom Raleigh, 2015)

For the identification of potential dimensions of Futures Consciousness, a set of criteria was developed to ensure the suitability of the result for empirical research and, potentially, the consequent development of a psychometric scale.

- First, for the concept to be useful for empirical research, it should be reasonably simple, and the number of dimensions should not be too high.
- Second, for the purposes of a psychometric scale that can be used to study large populations under different circumstances, the definition should be generic and non-contextual. In other words, changing contexts should not change individuals' Futures Consciousness.
- Third, for the purposes of empirical research set-ups, the concept should not describe or measure behaviour. Defining behaviour outside of the concept allows empirical studies that use Futures Consciousness as an explanatory factor for different types of behaviour.
- Fourth, for the concept to be useful also for broader purposes in futures research, the definition should be applicable to different kinds and types of entities, individuals, groups, organisations, societies, or even nations.

4.3 Article II: Application of the concept at the individual level

Based on the dimensions stipulated in the previous article, the next task was to look at the application of the Futures Consciousness (FC) concept – as well as its five dimensions identified in the previous stage of the process – to individuals. This included three tasks: 1) defining how FC relates to existing psychological theories, 2) the identification of existing, validated and studied psychological concepts and constructs that could be used to describe FC, and 3) reviewing research literature regarding the potential constructs and selecting the ones that seemed most suitable.

Regarding the approach, it was clear – due to the expertise of the participating psychologists – that the definition of the phenomenon and identification of relevant research would be based on social and personality psychology. The criteria described in section 4.1.1 above guided the selection of the constructs to describe each of the dimensions. In addition to the suitability in terms of content, the search for suitable constructs concentrated in dispositions and flexibilities relevant to each of the dimensions. In other words, the emphasis was on personality traits and dispositions that are more malleable than fixed, since the aim was to define FC as a capacity that can be developed. In most cases, psychological constructs that were widely used and already included psychometric measures to study them were prioritised over others. As a result, a set of potential concepts and constructs were selected for more detailed review.

The identification and review of the psychological concepts was performed with the help of literature searches using the following article databases: ScienceDirect, ProQuest, PsychArticles and PsychINFO (EBSCO). These databases were searched using keywords and written descriptions of the five dimensions laid out in the first article. Any interesting leads were followed further to other sources and databases. The identification and review of relevant psychological constructs was carried out as intensive teamwork, where both psychologists and futures researchers reviewed and compared potential candidates. Psychological research related to each of the listed constructs was carefully reviewed, and nearly 200 articles or books were included as references in writing the overviews of the constructs in article II.

Once the potential psychological constructs were identified and reviewed, their suitability was discussed within the team. Special attention was paid to finding constructs that corresponded well with the team's understanding of the FC dimensions and ignoring any constructs that included aspects that did not match with the overall concept. Many psychological constructs may include a compilation of different aspects, and they all needed to suit the concept of FC. In addition, a notable amount of psychological research existed on the connections between some of the psychological constructs and behaviours that could be considered future oriented, such as healthy lifestyles or pro-environmental behaviour. While such evidence was not considered a criterion for the inclusion of a certain construct, it strengthened their

relevance. Further evidence and examples of conditions where some psychological dispositions were changed or of connections between different interesting constructs were also sought. Evidence of connections between the different dimensions of FC strengthen the validity of the concept. In psychology, if a concept that describes a phenomenon, such as FC, consists of several dimensions, these dimensions need to strengthen each other. In other words, the concept must be more than just a sum of its parts; its explanatory power should be stronger (Wertheimer, 1944). To sum up the above, the review focused especially on the following perspectives:

1. What are the most relevant aspects of the chosen constructs with regard to the dimensions of Futures Consciousness?
2. What kinds of correlations have been found between the constructs and future-oriented behaviour?
3. What kinds of links have been identified between the constructs?

4.4 Articles III and IV: Development and revision of a psychometric scale

In order to gather empirical evidence of Futures Consciousness and its impacts on human behaviour, a psychometric scale – a standard tool used in psychological research – was developed. Psychometric scales consist of a set of questions and their response rating scales, commonly called items, which are each tested for their validity and reliability. Various statistical methods are used to ensure that the psychometric scales really measure what they claim to and do so consistently. In the development of the items for the scale, the following aspects were taken into consideration: the questions should be clear and short, and they should focus on one issue and avoid jargon, ambiguity as well as leading questions (See e.g. Robinson, 2018). Furthermore, a psychometric scale that measures a phenomenon that contains multiple dimensions should include items that represent their range and richness.

Building on the fourteen relevant psychological constructs identified in the previous stage of the process, a composite psychometric scale was developed and validated in article III. Due to some shortcomings, the scale was revised in article IV. Altogether, the process included five phases:

1. Original item selection.
2. Final item selection and testing the structure of the original scale.
3. Finnish and French scale validation.
4. Assessing social desirability bias.
5. Further development of items and testing the structure of the revised scale.

4.4.1 Original item selection

For each of the fourteen constructs, an existing psychometric scale was sought. Existing psychometric scales were utilised because the development of new and original items was considered too time-consuming, due to the fact they would have required additional testing and the recruitment of participants for the test rounds. If several scales were available, the criteria for inclusion focused on selecting the scale that was 1) the most valid, 2) most recent and 3) the shortest. The identified scales are presented in **Table 3** under each of the five dimensions of FC. For two of the constructs, holistic thinking and moral centrality, no suitable validated psychometric scales were found. The Virtuous Leadership Questionnaire (Wang & Hackett, 2016) was included to replace the latter, although it emphasised the readiness for risk-taking more than the original construct.

Table 3: Validated scales included in the first test, 160 items in total*.

TIME PERSPECTIVE	AGENCY BELIEFS	OPENNESS TO ALTERNATIVES	SYSTEMS PERCEPTION	CONCERN FOR OTHERS
Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999)	New General Self-Efficacy scale (Chen et al., 2001)	Openess to experiences from HEXACO (de Vries, 2013)	Nature Inclusiveness measure (St. John & MacDonald, 2007)	Identification with All Humanity scale (McFarland & Brown, 2008)
Consideration of Future Consequence scale (Strathman et al., 1994)	Life-Orientation test revised (Scheier et al., 1994)	Intolerance of Uncertainty scale (Carleton et al., 2007)	System Thinking scale (Davis & Stroink, 2016)	Short Schwartz's Values survey (Lindeman & Verkasalo, 2005)
Future Orientation scale (Beal, 2011)	Social Generativity scale (Morselli & Passini, 2015)	Critical Thinking Disposition scale (Sosu, 2013)		Virtuous Leadership Questionnaire (Wang & Hackett, 2016)
	Locus of Control (Sapp & Harrod, 1993)			

*Table published in Article III.

When put together, the selected scales amounted to 160 potential items. This long list of items was tested with 539 North American respondents, who were recruited through Amazon's Mechanical Turk⁶ in the autumn of 2016. The intention was to

⁶ Using Amazon's Mechanical Turk to obtain responses allowed the gathering of demographically varying data from American respondents.

test which of these items could be included in a shorter, composite scale of Futures Consciousness. The respondents answered all questions in a randomised order on a 5-point Likert scale. The respondents were 18–76 years of age, 210 men and 329 women. Based on the results, 30 items were selected for the next phase.

4.4.2 Final item selection and testing the structure of the original scale

The second phase focused on testing the structure of the scale, i.e. studying the interdependency between the items and their accuracy in measuring the dimensions they are supposed to represent. For this purpose, 600 American respondents were recruited through Amazon’s Mechanical Turk to answer the thirty-item scale in the autumn of 2016. The respondents were 18-79 years of age, 249 male, 342 female and 3 undisclosed. A subsample of these respondents agreed to fill in the questionnaire again one month later to participate in assessing the test-retest validity.

In addition to the factorial analysis and test-retest reliability, the convergent and concurrent validity of the scale was evaluated. In other words, the results from the FC scale were compared with results from other scales on theoretically similar concepts (convergent validity) and with scales measuring related behaviour (concurrent validity)⁷. For this purpose, the participants completed – together with the thirty Futures Consciousness items – another eight psychometric scales (see **Table 4**) that measure a) psychological constructs or motivations that could be expected to be related to Futures Consciousness, or b) behaviours that can be considered future-oriented. The FC Scale was deemed valid on these accounts.

Table 4: Scales used to test for convergent and concurrent validity of the Futures Consciousness Scale.

CONVERGENT VALIDITY

Big Five Inventory (John & Srivastava, 1999)	Mindful Attention Awareness Scale (Brown & Ryan, 2003)	Need for cognition (Cacioppo, Petty, & Kao, 1984)	Need for closure (Roets & Van Hiel, 2011)	Chronic regulatory focus (Lockwood, Jordan, & Kunda, 2002)
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CONCURRENT VALIDITY

Altruistic behaviour (Rushton, Chrisjohn, & Fekken, 1981)	Active and engaged citizenship (Zaff, Boyd, Li, Lerner, & Lern9er, 2010)	Pro-environmental behaviour (Kaiser & Wilson, 2004)
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⁷ For an overview of the various types of reliability and validity that are relevant for psychometric scales see Robinson, 2018.

4.4.3 Finnish and French scale validation

The FC Scale was translated into Finnish and French in a similar process including an initial translation from English to the target language by a bilingual native French/Finnish speaker. Then, the scale was translated back by a bilingual English speaker. At the third stage, the original English version and the final translation back to English were compared, their discrepancies analysed, and wordings adjusted until all parties were satisfied with them.

The translated scales were then tested with university students in a Swiss francophone university (278 students, 95 men, 159 women, 24 undisclosed) and a Finnish university (429 students, 127 men, 296 women, 6 undisclosed). In addition to the FC scale, the French-speaking respondents also completed the pro-environmental behaviour scale, and a sample (n=104) of the Finnish-speaking students completed the scales of altruism and civic behaviour to measure the concurrent validity of the scale in both languages.

4.4.4 Assessing social desirability bias

To ensure that the FC Scale results are not sensitive to any intended or unintended bias by respondents who wish to respond in ways that make them look better than they are in reality, the Marlow-Crowne social desirability scale was tested with altogether one hundred American (n=42), French (n=37) and Finnish (n=21) respondents. The respondents answered – in their respective languages – the short form of the social desirability scale (Reynolds, 1982) together with the FC scale.

4.4.5 Further development of items and testing of the revised scale

Due to some shortcomings with the items addressing the time perspective and system perception dimensions of the scale (see section 5.3.6), six new items were created after consultations with experts in psychology and futures education. The new items were tested, together with the original scale, with a sample of 1,684 respondents (743 male, 911 female, 30 undisclosed), who took part in a large survey of political and social views of British people over the summer of 2020.

The convergent validity of the new items was tested with the short version of the Big Five Inventory (Rammstedt & John, 2007). Furthermore, concurrent validity was tested with a question on self-reported engagement in fourteen different types of collective action and one item on general interest in politics. These were considered as indicators of active and engaged citizenship (see **Table 4**).

4.5 Article V: Applying the psychometric scale in a mixed-method research design

In article V, the explanatory power of the five-dimensional model of Futures Consciousness and the FC Scale was tested in a mixed-method research set-up including the FC Scale, interviews and a survey. The aim of the research was to provide insight into the preferences of elite representatives regarding sustainable consumption policies and radical policy shifts. Futures Consciousness was used as a tool to shed light on the representatives' different motivations, interests, and ways of thinking.

All participating Finnish elite representatives filled in the original FC Scale. In addition to the original 20-item FC Scale, three items from the Consideration of Future Consequences (CFC) scale (see **Table 9**) were included. Even though the CFC items were discarded from the original FC Scale due to low readability, it was not considered problematic with this target group (see also section 5.3.2). Furthermore, all participants participated in personal face-to-face interviews and responded to a survey, in which they evaluated the feasibility and acceptability of fourteen different consumption policies. An overview of the elite members is provided in **Table 5**, while the interview questions are listed in **Table 6** and policy measures in **Table 7**.

Table 5: Number of elite members that participated in the study by background⁸.

SECTOR OF SOCIETY	SELECTED ORGANISATIONS	# REPRESENTATIVES
Parliament	All political parties currently in the Finnish Parliament	3
Local government	Two cities selected by random – from 1st to 5th and 6th to 10th largest cities	2
Ministries	All ministries relevant to the consumption of natural resources	3
Interest groups	All major economic and employment interest groups	4
Companies	Largest companies in the food, transport, housing and consumer product sectors	1
Science	Main policy research organisations independent of government	3
Media	Largest media companies	2

*Table published in Article V.

⁸ The participants of the research were promised anonymity and hence their names and organisations are not disclosed. Although article V claims that the participants were promised full anonymity, it is possible for other researchers to check the interview recordings and transcripts, as long as full confidentiality is ensured.

During the analysis, the elite representatives were classified into three groups. The classification was made based on a hierarchical cluster analysis, which was carried out using the SPSS software in a similar style to, for example, disaggregative Delphi (Tapio, 2003). The cluster analysis was based on the evaluation of the acceptability of the 14 policies (see Table 7) by the respondents. The three clusters were then compared with each other in terms of their scores on the FC Scale. Finally, the transcribed interview data was thematically coded and analysed to identify differences and similarities between these groups in terms of their opinions, motivations, and the arguments they used concerning the potential use of new and sustainable consumption policies in the coming decades.

Table 6: Interview questions for Finnish elite representatives.

#	QUESTION
1	What do you think of the target to reduce 70–80% of current consumption levels by 2050? Do you find it acceptable, or even possible?
2	Should we try to aim for the above-mentioned goal?
3	By when would you think such a change could be achieved?
4	If you had the all the powers, how would you try to realize this goal?
5	What kind of policy measures would you use?
6	What do you think of stronger measures, like quotas for CO2 emissions or resource use?

Table 7: Consumption policies evaluated by the participants of the study*.

SHORT NAME	EXPLANATION	CLASSIFICATION
Local bonus schemes	Setting up local bonus schemes that encourage lifestyles with low resource consumption	enabling
Neighbourhood sharing facilities	Setting up facilities for sharing equipment, tools, machines, etc. in all urban neighbourhoods	enabling
Right to part time work	The right of all employees to decide their working hours	enabling
Shared use of living space	Increasing the number of shared spaces, e.g. through housing regulation	enabling
National target for resource consumption	Setting a national per-capita target (e.g. 8-ton material footprint) for natural resource consumption by 2050	informative
Individual level consumption reporting	Yearly monitoring & reporting of natural resource consumption at the individual level	informative
Ban on advertisements	Ban on advertisements for specific products or services (e.g. flights, meat) that have a high impact on resource consumption	informative/disabling
Resource tax for specific products	High tax (40–70%) on specific products or services (e.g. flights, meat) that have a high impact on resource consumption	disabling
Material footprint tax	Material footprint tax on all products and services	disabling
Restrictions to the size of apartments	Setting limits to the housing square meters per person	disabling
Quotas for selected products	Personal quotas for selected products and services that have a high impact on resource consumption	disabling
General consumption quotas	Personal quotas for all natural resource consumption	disabling
Reducing maximum working hours	Reducing maximum working hours (e.g. 25 hours/week)	disabling
Maximum wage cap	Setting a maximum wage cap (e.g. €150,000/year/household)	disabling

*Table published in Article V.

5 Results – from definition to measurement and application

The results were published in five articles. The first operationalised the concept of Futures Consciousness in five dimensions and developed the first descriptions of these dimensions. The second article studied psychological constructs that can be used to describe these dimensions. The third developed a psychometric scale to measure the phenomenon, and the fourth revised the scale. The final article presented a small-n qualitative study of Finnish elite members that utilised the concept and the psychometric scale of Futures Consciousness to understand the motivations behind their policy choices. The main results from the five articles are presented below.

5.1 The five dimensions of Futures Consciousness

Article I outlines different existing definitions of future consciousness and related concepts, such as prospection, anticipation, futures literacy, and future orientation. Building on this review and collecting and analysing various characteristics used in the definitions of these concepts, the article produces a description of Futures Consciousness that includes five dimensions.

The lists of characteristics collected during the analysis of the different definitions of future consciousness and similar terms were organised into five different groups shown in **Table 8**. Once the groups were created, each was given a heading that would embody the essential commonalities between the characteristics described in each group: time perspective, agency beliefs, openness to alternatives, systems perception, and concern for others. In addition, one group included miscellaneous terms, of which most could not be considered as characteristics.

Table 8: Classification of the collected characteristics*.

TIME PERSPECTIVE	SYSTEMS PERCEPTION
<p>Length (Sande 1972) Sense of time (Lombardo, Cornish 2010) Extension (Beal 2011, Trommsdorff 1983) Look far away (Berger in Godet, Roubelat 1996) Temporal and situational awareness (Miller 2007) Forward thinking is preferable to crisis management (Slaughter 1996) The meaning of time (Bell 2003) Long timeframe (Heinonen 2013, Heinonen, Balcom Raleigh 2015) Reach (Mische 2009) Connectivity (Mische 2009)</p>	<p>Level of interest (Sande 1972) Look breadthwise (interactions) (Berger in Godet, Roubelat 1996) Rigorous imagining (Miller 2007) Decisions have long-term consequences (Slaughter 1996) Interdependence and holism (Bell 2003) Futures studies deals with complex wicked problems (Sardar 2010) Multidisciplinarity and multisectorality (Heinonen 2013, Heinonen, Balcom Raleigh 2015) Complexity, systems thinking, and holistic thinking (Heinonen 2013, Heinonen & Balcom Raleigh 2015) Sociality (Mische 2009)</p>
OPENNESS TO ALTERNATIVES	AGENCY BELIEFS
<p>Sense of trends and challenges (Lombardo, Cornish 2010) Creativity, imagination, and curiosity (Lombardo, Cornish 2010) Courage and enthusiasm (Lombardo, Cornish 2010) Imagination and innovation (Berger, in Durance 2010) Courage (Berger, in Durance 2010) Look in depth (Berger in Godet, Roubelat 1996) Take risks (Berger in Godet, Roubelat 1996) Questioning the assumptions of present decisions (Miller 2007) Future transformations are certain to occur (Slaughter 1996) Future alternatives imply present choices (Slaughter 1996a) The possible singularity of the future (Bell 2003) Scepticism regarding simple solutions and criticism that aims to open pluralistic potentials (Sardar 2010) Identifying emerging issues and anticipating surprises (Heinonen 2013, Heinonen, Balcom Raleigh 2015) Critical thinking and constant questioning (Heinonen 2013, Heinonen, Balcom Raleigh 2015)</p>	<p>Optimism (Sande 1972) Influence (Sande 1972) Optimism about the future (Lombardo, Cornish 2010) Courage and enthusiasm (Lombardo, Cornish 2010) Sense of personal growth and purpose (Lombardo, Cornish 2010) Self-efficacy and self-responsibility (Lombardo, Cornish 2010) Affect (Beal 2011, Trommsdorff 1983) Motivation (Beal 2011, Trommsdorff 1983) Control (Beal 2011, Trommsdorff 1983) Team spirit (Berger, in Durance 2010) Enthusiasm (Berger, in Durance 2010) Being calm, self-control (Berger, in Durance 2010) Future alternatives imply present choices (Slaughter 1996) Futures thinking and action (Bell 2003) An open future (Bell 2003) Humans make themselves (Bell 2003) Proactivity and action (Heinonen 2013, Heinonen, Balcom Raleigh 2015) Volition (Mische 2009) Capacity for commitment, resoluteness toward action, clarity of follow-through (Ogilvy 2011)</p>

Taking radical and unorthodox views seriously (Heinonen 2013, Heinonen, Balcom Raleigh 2015) Alternative thinking (Heinonen 2013, Heinonen, Balcom Raleigh 2015) Breadth, contingency, expandability (Mische 2009) Curiosity, willingness to learn, eagerness to experience new frames of reference (Ogilvy 2011)	
CONCERN FOR OTHERS	MISCELLANEOUS
Values (Sande, 1972) Better futures (Bell, 2003) Take care of humanity (Berger in Godet & Roubelat, 1996) Assuring cultural diversity (Sardar, 2010) Participatory approaches (inclusive interaction) (Heinonen, 2013; Heinonen & Balcom Raleigh, 2015) Value rationality (Heinonen & Balcom Raleigh, 2015)	Expectations (Sande, 1972) Future-oriented self-narrative (Lombardo, Cornish 2010) Detail (Beal 2011, Trommsdorff 1983) Domain (Beal 2011, Trommsdorff 1983) Sequence of events (Beal 2011, Trommsdorff 1983) Number of cognitions (Beal 2011, Trommsdorff 1983) Sensitivity (Berger, in Durance 2010) The most useful knowledge (Bell 2003) Future facts (Bell 2003) Relevance of future discourse lies in its impact on the present (Sardar 2010) Clarity (Mische 2009) Genre (Mische 2009)

*Table published in Article I.

Some of the dimensions, such as time perspective and systems perception, stood out quite clearly in the analysis. In some form, they were present in most of the definitions. The main question centred around the focus of the temporal perspective – should Futures Consciousness refer only to the future perspective, or should it rather require a balanced understanding of all: past, present and future? The latter understanding seemed to better reflect the intensions of the authors we examined. It should also be noted that these two dimensions, time perspective and systems perception, are actually related: the understanding of time as a sequence of events that follow each other is a very systemic perception of it.

Other dimensions, such as agency beliefs and openness to alternatives, were identified amongst numerous examples of seemingly similar and overlapping characteristics. Terms that described characteristics related to taking action, being in control or having an impact were all classified under agency beliefs, although some of the included characteristics were difficult to place. For example, while Bell's characteristic 'An open future' is a reference to the fact that the future is open, Bell

specifically emphasises that the openness of the future makes our actions meaningful. Hence, this term could also have been classified under openness to alternatives. Initially, the heading for the dimensions of agency beliefs was just ‘agency’, but in order to emphasise the *experience* of being able to influence events, the word ‘beliefs’ was added to it. This choice of words was later supported by psychological theory on agency, as will be seen in the next section. Agency beliefs also emphasised the motivational aspects that were included in some of the characterisations, such as enthusiasm and team spirit. Regarding the openness to alternatives dimension, it seemed to include three types of characteristics: looking for or understanding alternative futures, critical thinking, and personality traits such as creativity and courage. These could all be considered components of openness to alternatives: alternative futures need both critical as well as creative and courageous thinking.

The last dimension, concern for others, features the fewest mentions in the table of character lists, yet it includes a group of distinctive set of characteristics that did not sensibly fit in with any other dimension. This dimension includes different types of aspects: interest in a better future, values, inclusion, and diversity. The potential dimensions that these characteristics could have been combined with are agency and systems perception. After all, a strong systemic view of the world could be seen to lead to a strengthened interest in the welfare of humanity now and in the future, and diversity and inclusion do increase agency beliefs. However, this would have resulted in the loss of the ethical essence behind these aspects in particular, and hence the dimension was included separately. The name of the dimension was chosen to reflect the fact that *caring* is the main characteristic that makes us interested in striving for a better future.

The five different dimensions of Futures Consciousness could be summarized in the following way:

- **Time perspective** refers to our awareness of the passing of time, the relationship between past, present and future, and the way in which events and their consequences follow each other as sequences over time. It emphasises the value of long-term thinking.
- **Agency beliefs** describe the extent to which it seems possible to influence the course of future events both at the personal and societal level. It emphasises how the future is the result of a complex web of interconnected individual actions. An essential part of agency is the differentiation between issues that can and cannot be influenced.
- **Openness to alternatives** prepares us for the fact that the future may bring surprises. It entails the critical evaluation of established truths and commonly shared opinions to discover unconventional solutions and alternative paths. Openness to alternatives requires tolerance of uncertainty regarding the future.

- **Systems perception** focuses on the interconnectedness between human and natural systems as well as the complex consequences of the decisions we make. Systemic and holistic approaches facilitate a better understanding of potential interactions and interdependencies within and between systems.
- **Concern for others** describes one’s concern and commitment to contributing to the future well-being of others beyond ourselves, of society, and even the future of generations yet unborn. It emphasises the interconnectedness of the futures of humanity and the need to create a better world for everyone.

5.2 Futures Consciousness at the individual level

Article II utilises existing theories and concepts in the fields of personality and social psychology to build our understanding of the five dimensions of Futures Consciousness as individual capacities. It provides an in-depth study of the psychological constructs (see **Figure 2**) that are used for the scale development presented in section 5.3. The following subsections present a short overview of the relevant findings for each dimension.

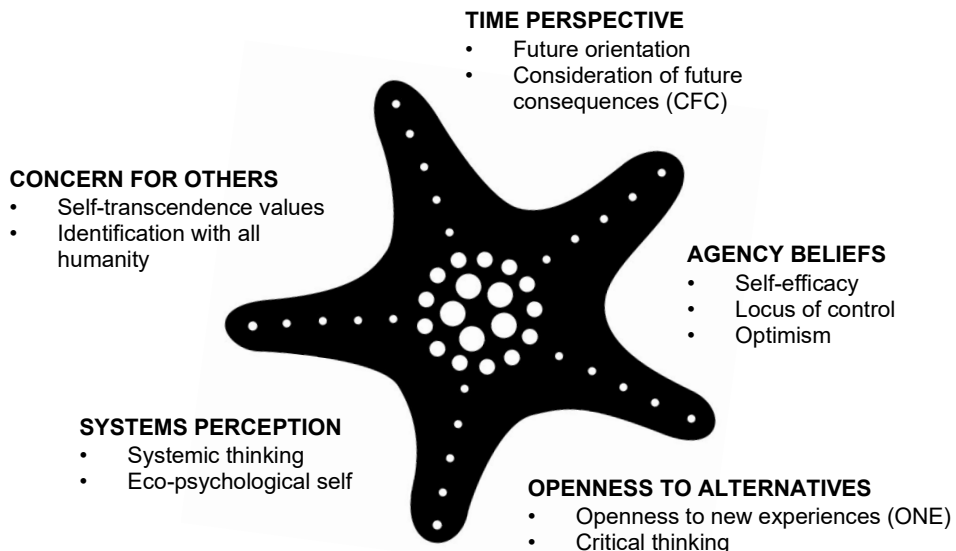


Figure 2: The psychological concepts used to describe the five dimensions of Futures Consciousness

5.2.1 Time perspective

Two concepts were identified as central when describing how people perceive and interact with the passing of time: future orientation and consideration of future consequences. Future orientation is described by the **Zimbardo Time Perspective Inventory** (ZTPI) (Zimbardo, McDermott, & Zimbardo, 2017; Zimbardo, P. G. & Boyd, 1999), which identifies five different ways to approach time among individuals: past-negative, past-positive, present-hedonism, present-fatalism and future. These approaches predict different types of behaviour: future orientation has been shown to relate to less risky behaviour (Keough, Zimbardo, & Boyd, 1999), long-term orientation (Zimbardo, P. G. & Boyd, 1999), pro-environmental behaviour (Milfont & Demarque, 2015), and better reflexive decision-making (Eskritt, Doucette, & Robitaille, 2014). Zimbardo and Boyd (1999) suggest that an ideal time perspective would be a balance between past-positive, present-hedonism and future.

The second psychological construct relevant to time perspective is **Consideration of Future Consequences**, often referred to as the CFC. It reflects the extent to which individuals consider the distant consequences of their choices (Strathman et al., 1994). In studies, the CFC has been shown to predict more healthy and less risky behavioural choices (McKay, Percy, & Cole, 2013; van Beek, Antonides, & Handgraaf, 2013; Strathman et al., 1994) as well as commitment to social movements and pro-environmental behaviour (Bruderer Enzler, 2015; Strathman et al., 1994). Interestingly, the CFC seems to relate to longer term planning and goal setting by stimulating more abstract-level thinking (Joireman, Van Lange & Van Vugt, 2001).

Research into ZTPI and CFC has also confirmed some findings that may be familiar to futurists: studies have shown that “episodic future thinking” reduces delay discounting and can be taught (Bromberg, Wiehler, & Peters, 2015; Daniel, Said, Stanton, & Epstein, 2015). Hence, an exercise in imagining or simulating future experiences during a futures workshop or strategic planning meeting increases the importance assigned to events in the distant future and enables more informed long-term planning. Furthermore, the remoteness of the imagined future makes a difference as well: in one study, thinking of a future that was fifty years away increased imagination and creativity to a far greater degree than thinking of the present or a future that was just five years away (Chiu, F., 2012).

5.2.2 Agency beliefs

Three constructs were identified as relevant to the agency beliefs dimension of Futures Consciousness: locus of control, general self-efficacy, and optimism.

Locus of control can be simplified into two main dimensions: individuals with an *internal* locus believe they are in control of the events happening in their own life, whereas individuals with an *external* locus believe that others, or uncontrollable factors, such as powerful others or fate, dominate the events in one's life (Lefcourt, 1991; Rotter, 1966). Higher internal locus is found to predict many outcomes of potentially future-conscious behaviour, such as better health, marital satisfaction, higher delay gratification, and less work accidents (Furnham & Steele, 1993).

General self-efficacy, on the other hand, describes the extent to which an individual believes oneself capable of achieving intended outcomes. It is not connected to actual ability, but their own subjective reliance on their abilities. It is strongly dependent on personal experiences and related to individuals' expectations of possible and desired futures, and hence it determines whether a future task is considered attainable or impossible (Bandura, 1977). Studies show that general self-efficacy is connected to many positive outcomes, such as health (Conner & Norman, 2015) and, interestingly, with a higher capacity for mental time travel, i.e. imagining oneself in a future situation (Brown, A. D., Dorfman, Marmar, & Bryant, 2012).

Optimism represents the likelihood that an individual expects positive rather than negative future outcomes in general. Contrary to general understanding, optimism is not the opposite of pessimism, as they actually represent two separate traits⁹ (Alarcon, Bowling, & Khazon, 2013; Bryant & Cvengros, 2004). The value of optimism is equivocal to the concept of Futures Consciousness: optimism is linked with higher perseverance, success, better health and the capacity to cope with crises (Boyd & Zimbardo, 2005; Seligman & Csikszentmihalyi, 2000), but it can also result in decisions made with unrealistic expectations or chaotic management due to a lack of planning (Oettingen & Sevincer, 2018; Oettingen, 2012). And while pessimistic individuals could be expected to excel in evaluating potential risks, in general they identify strongly with a lack of agency (Bryant & Cvengros, 2004). Hence the significance of optimism is mainly related to its relevance in influencing individuals' sense of agency: optimism could increase one's self-efficacy and locus of control.

5.2.3 Openness to alternatives

The first two dimensions, time perspective and agency beliefs, are based on more established sets of psychological constructs that have been used by psychological

⁹ In other words, if an individual rejects being optimistic or pessimistic, it does not make them the other, but rather non-optimistic or non-pessimistic.

researchers for the study of future orientation (see e.g. Kostić & Chadee, 2017; Seginer, 2009). The next three dimensions, however, are less established, and the selection of the combinations of constructs used in their study required more developmental work. For openness to alternatives, two constructs were identified as relevant: openness to experience and critical thinking.

Openness to experience is the only construct used in describing the five dimensions of Futures Consciousness that represents a personality trait, i.e. it is a relatively stable characteristic. It is included in both the Five-Factor Personality Model (Costa & McCrae, 1992) and the HEXACO Personality Inventory (Lee & Ashton, 2004), and it is described as being, for example, inquisitive, curious, creative, experimental and unconventional in nature. Openness to experience is connected to critical thinking, divergent thinking, and the ability to predict near-future events (Tetlock & Gardner, 2016; Clifford, Boufal, & Kurtz, 2004; McCrae, 1987). Individuals with high openness to experience are also often high on self-direction (Schwartz et al., 2012) and low on political conservatism and religious fundamentalism (Jost, Glaser, Kruglanski, & Sulloway, 2003; Saroglou, 2002).

Critical thinking is a widely researched phenomenon that has been studied with numerous theories and constructs. Due to the criteria set at the beginning of this section, the study of critical thinking as a disposition – rather than a form of intelligence – is more relevant to understanding Futures Consciousness. Dispositional understanding of critical thinking emphasizes thinking styles and the tendency for reflexive thinking and inquisitiveness (Facione, Facione, & Giancarlo, 2001; Perkins, Jay, & Tishman, 1993). The two-factor model of critical disposition (Sosu, 2013) includes critical openness and reflective skepticism. The former focuses on the evaluation of new ideas and evidence, whereas the latter learns from previous experience and evaluates available evidence. Critical thinking correlates with educational level and social emotional learning (Arslan & Demirtas, 2016; Sosu, 2013).

In addition to the concepts above, the concept of *intolerance of uncertainty* was considered conceptually relevant to openness to alternatives, although the statistical analysis in article III concluded it to be redundant with the other concepts in the scale. Intolerance of uncertainty describes the capability of an individual to endure and manage uncertainty (Kagan, 1972), which is especially relevant regarding the unpredictability of future events.

5.2.4 Systems perception

The relevant constructs for systems perception were identified to be systems thinking and eco-psychological self.

Systems thinking refers to abstract-level causal thinking patterns that often occur in cyclical form (Maani & Maharaj, 2004). Systemic thinkers have been shown to identify longer chains of causality and better understand how tasks are to be carried out (Thibodeau, Frantz, & Stroink, 2016). They also have a strong environmental worldview and exhibit pro-environmental behaviour. Systemic thinking correlates negatively with authoritarianism and, according to some studies, can be taught (Fazey, 2010; Sterman, 2010).

Eco-psychological self refers to individuals who include nature as part of their own self-concept. This inclusion can expand to cover even the entire universe (Pappas & Friedman, 2007). It contradicts the modern concept of separating “I” from “others” and emphasises a sense of communion (Chiu, K. A., 2010). The concept is related to biospheric environmental concerns that have been shown to cause pro-environmental behaviour (Schultz, 2001).

In addition to the above, the concept of holistic thinking was considered relevant to the concept of Futures Consciousness. Holistic thinking has been found to vary between Eastern and Western cultures (Nisbett, Peng, Choi, & Norenzayan, 2001), which might provide an interesting perspective. However, at the time, we could not find a validated scale items that could have been included in the FC Scale.

5.2.5 Concern for others

Two constructs were found most relevant to the concern for others dimension: self-transcendence values and identification with all humanity.

Self-transcendence values – benevolence and universalism – are part of the basic value system identified by Schwartz, which includes ten values in total (Schwartz et al., 2012). These two values are motivated by transcendence of selfish interests and promoting others, the former being more motivated by people they are in closer contact with and the latter with all people and nature. Self-transcendence values predict pro-social behaviour, empathy, and compassion (Tamir et al., 2016; Caprara & Steca, 2007).

Identification with all humanity is a construct that describes individuals who categorise themselves as members of the same group as everyone else on the planet, in contrast to individuals that only identify with smaller groups of people, such as their family, culture, region, or nation (Mcfarland, Sam, Webb, & Brown, 2012). Individuals who strongly identify with all humanity experience stronger moral obligation towards people of different nationalities, ethnicities or religions, and they

are more likely to act in accordance with their values than individuals with strong self-transcendence values.

5.3 The Futures Consciousness Psychometric Scale

Article III describes the development process of a psychometric scale for the measurement of Futures Consciousness. A psychometric scale allows empirical research on the existence, variations and consequences of Futures Consciousness, even among larger populations. The development process included item selection, statistical testing and validation as well as the validation of Finnish and French translations and, finally, the assessment of social desirability bias. The shortcomings of the psychometric scale are revised in article IV.

5.3.1 Selection of the first set of scale items

The responses to the first test phase were initially analysed with principal component analysis to identify the most relevant items. As a result of this analysis, around a third of the items were discarded. Next, the hypothesised items related to each of the five dimensions were analysed separately with confirmatory factorial analysis (CFA). Items with weak links to the five dimensions, with low loadings or high redundancy with other items, were discarded. Finally, the retained items were tested to ensure that they formed a model with satisfactory fit for all the dimensions. Hence, the analysis relied on both statistical and subjective content analysis.

Out of the 160 items in the first phase of the item selection for the scale, 30 items were retained (see **Table 9**). Of the validated scales included in the test (see **Table 3**), some items from all of them, except social generativity and the intolerance of uncertainty, were included in these 30 items.

5.3.2 Identification of a 20-item original scale

During the second phase, an exploratory factorial analysis was conducted with half of the sample ($n=297$). This resulted in a 20-item scale with five factors that corresponded to the five-dimensional theoretical model of Futures Consciousness (see **Table 9**). The omission of the ten items was based on the following findings:

- Two items on the System Thinking scale (SP2 and SP3) actually loaded on the ‘concern for others’ factor rather than ‘systems perception’. In other words, those items did not actually measure systems perception as expected.

- Single items from the Critical Thinking Disposition scale (OA4) and Openness to Experience scale (OA5) had significant cross-loadings on both the ‘concern for others’ and ‘openness to alternatives’ factors. Similarly, one item from the Future Orientation scale (TP1) also had significant cross-loadings on both the ‘time perception’ and ‘openness to alternatives’ factors. Hence, these items did not clearly measure one dimension, but many dimensions simultaneously, which confused the results from the scale.
- Two items originally from the Virtuous Leadership Questionnaire (CO1 and CO2) formed a factor of their own. Since the scale was originally used to replace a missing scale on moral centrality, but emphasised aspects such as leadership and risk-taking more than originally intended, these items were discarded.
- Items from the CFC and Future Orientation scales loaded on two separate factors instead of one common factor, i.e. ‘time perspective’. In analysing the interfactor correlations, the CFC did not correlate with the ‘systems perception’ factor, whereas the Future Orientation questions did correlate with all other factors. Since the CFC scale has been criticised for low readability and potentially low reliability (Crockett, Weinman, Hankins, & Marteau, 2009; McKay et al., 2013), the CFC questions were discarded.

Table 9: The items of the original Futures Consciousness Scale after the first and second phase of analysis. The final items are numbered from 1 to 20.

PHASE 1	PHASE 2	SCALE ITEM
TP1		Before making a decision, I weigh the good vs. the bad.
TP2	1	I think about the consequences before I do something.
TP3	2	I think about how things might be in the future.
TP4	3	I think often about what tomorrow will bring.
TP5		I only act to satisfy immediate concerns, figuring the future will take care of itself.
TP6		I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.
TP7		I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.
AB1	4	I believe I can succeed at most any endeavor to which I set my mind.
AB2	5	I hardly ever expect things to go my way.
AB3	6	I rarely count on good things happening to me.
AB4	7	I am usually able to protect my personal interests.
AB5	8	I feel like what happens in my life is mostly determined by powerful people.
OA1	9	I often use new ideas to shape (modify) the way I do things.
OA2	10	I am often on the lookout for new ideas.
OA3	11	I often re-evaluate my experiences so that I can learn from them.
OA4		I often think about my actions to see whether I could improve them.
OA6		I think that paying attention to radical ideas is a waste of time.
OA7	12	I find it boring to discuss philosophy.
SP1	13	I think that all the Earth's systems, from the climate to the economy, are interconnected.
SP2		The Earth, including all its inhabitants, is a living system.
SP3		Seemingly small choices we make today can ultimately have major consequences.
SP4	14	I have had the experience of feeling "at one" with nature.
SP5	15	At least one time in my life, I have felt united with nature.
CO1		I initiate a long-term and worthwhile project despite risking personal reputation.
CO2		I lead fundamental change though it may entail personal sacrifice and personal risk.
CO3	16	I show concern and care for peers.
CO4	17	I believe in being loyal to all mankind.
CO5	18	When they are in need, I want to help people all over the world.
CO6	19	Universalism (that is, broad-mindedness, beauty of nature and arts, social justice, a world at peace, equality, wisdom, unity with nature, and environmental protection) is an important life-guiding principle for me.
CO7	20	Benevolence (that is, helpfulness, honesty, forgiveness, loyalty, and responsibility) is an important life-guiding principle for me.

5.3.3 Validation of the original scale

A confirmatory factorial analysis was conducted with the second half of the sample to confirm the hierarchical structure of the five factors (see **Figure 3**). The fit indices yielded acceptable values, and a likelihood ratio test found it favourable to other alternatives, such as five independent factors, single factor, and the independent model. The five dimensions were tested to be either of acceptable or good reliability, and furthermore, the overall FC Scale was found to have good reliability. This result suggests that Futures Consciousness can be understood as a general, independent concept, despite being composed of many dimensions.

Further analysis confirmed the test-retest reliability to be acceptable. Regarding the convergent and discriminant validity, the FC was positively correlated with four personality traits: extraversion, agreeableness, conscientiousness and openness to experiences as well as with dispositional mindfulness, need for cognition, and chronic promotion focus. In terms of concurrent validity, the FC predicted every tested behaviour: altruism, civic behaviour, and pro-environmental behaviour. In other words, respondents with high scores in FC also reported high occurrences of the mentioned behaviours.

Finally, some small effects were identified regarding the manner in which interindividual differences predicted FC scores: women, more educated and older participants were more likely to have higher levels of FC.

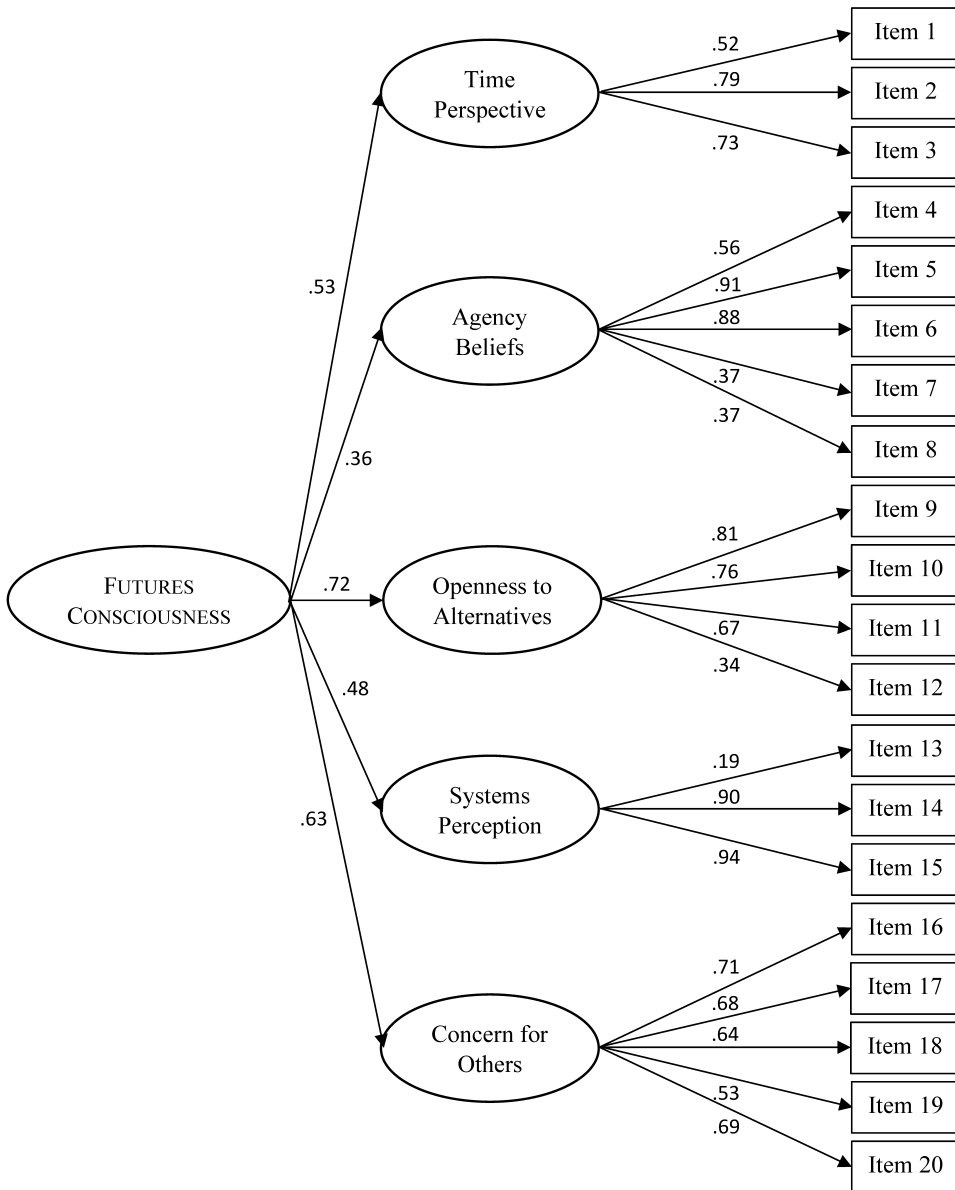


Figure 3: The results of the confirmatory factorial analysis of the original 20-item five-factor model. Loadings are standardised (completely standardised solution) and are all significant at $p=.002$ or smaller. Graph published in Article III.

5.3.4 Finnish and French FC Scales

The scale structure of the translated versions of the FC Scale was confirmed with confirmatory factorial analysis. The finding of higher FC levels among older participants was confirmed with the Finnish sample, but not the French, whereas

both samples found some effect of older age. The test of the Finnish FC Scale predicted positively altruistic behaviour and engaged citizenship, and the French scale positively predicted pro-environmental behaviour.

5.3.5 Assessment of Social Desirability Bias

Finally, the FC Scale was tested for respondent bias, i.e. responding in ways that could be considered favourable or fulfilling expectations. The Marlow-Crowne social desirability scale assesses how important social approval is to respondents (Reynolds, 1982). If respondents with high social desirability scores also score high on the FC Scale, this would indicate the scale being sensitive to social desirability bias. However, this was not the case: the correlations between the two scales in all language groups was nonsignificant.

5.3.6 Validation of the revised 20-item FC Scale

The development of the revised version of the Futures Consciousness Scale addressed the two main shortcomings that weakened the content validity of the original scale:

1. The items from the Consideration of Future Consequences (CFC) scale had been found problematic and were left out of the original scale (See TP5, TP6 and TP7 in Table 9). Hence, the CFC construct was not included in the original scale at all.
2. The systems thinking scale items were left out because their construct validity was low: they seemed to measure other things than systems thinking (See items SP2 and SP3 in Table 9). Hence, the systems perception dimension of the FC Scale consisted mainly of items covering the construct of the eco-psychological self.

Seven new items were developed to resolve these shortcomings. An additional item was included to test if it could be used to replace some of the agency beliefs items that were statistically weaker. These eight items were tested together with the original scale items with confirmatory factorial analysis and using the ant colony optimisation (Dorigo & Stutzle, 2019) procedure. The resulting new scale provided a statistically more satisfactory result than the original scale. The revised 20-item scale can be seen in **Table 10**. Five items from the original scale were replaced with new items that covered the missing aspects of systems thinking and consideration of future consequences and replaced the weaker agency beliefs items. Yet none of the constructs covered by the original scale were lost. The revised scale also featured a better balance in terms of the number of items per dimension: four items for each.

Table 10: The original FC Scale items, the new, tested items, and the final revised scale items numbered from 1 to 20.

ORIGINAL	REVISED		SCALE ITEMS
TP1	TP1	1	I think about the consequences before I do something.
TP2	TP2	2	I think about how things might be in the future.
TP3			I think often about what tomorrow will bring.
	TP3	3	I am willing to sacrifice my immediate happiness or well-being in order to achieve something in the future.
	TP4	4	I consider how things might be in the future, and try to influence those things with my day to day behavior.
AB1	AB1	5	I believe I can succeed at most any endeavor to which I set my mind.
AB2	AB2	6	I hardly ever expect things to go my way.
AB3			I rarely count on good things happening to me.
AB4	AB3	7	I am usually able to protect my personal interests.
AB5			I feel like what happens in my life is mostly determined by powerful people.
	AB4	8	I am always optimistic about my future.
OA1	OA1	9	I often use new ideas to shape (modify) the way I do things.
OA2	OA2	10	I am often on the lookout for new ideas.
OA3	OA3	11	I often re-evaluate my experiences so that I can learn from them.
OA4	OA4	12	I find it boring to discuss philosophy.
SP1	SP1	13	I think that all the Earth's systems, from the climate to the economy, are interconnected.
SP2	SP2	14	I have had the experience of feeling "at one" with nature.
SP3			At least one time in my life, I have felt united with nature.
	SP3	15	I think understanding how a chain of events occur is crucial.
	SP4	16	I easily see connections between events and things even when they first seem unrelated.
			When I want to change something, I keep in mind that proposed changes can affect the whole system.
			I think small changes can produce important results.
			I believe it is not possible to understand the parts without considering the whole picture.
CO1	CO1	17	I show concern and care for peers.
CO2	CO2	18	I believe in being loyal to all mankind.
CO3	CO3	19	When they are in need, I want to help people all over the world.
CO4			Universalism, that is, broad-mindedness, beauty of nature and arts, social justice, a world at peace, equality, wisdom, unity with nature, and environmental protection, is an important life-guiding principle for me.
CO5	CO4	20	Benevolence (that is, helpfulness, honesty, forgiveness, loyalty, and responsibility) is an important life-guiding principle for me.

Convergent validity testing showed that Futures Consciousness measured with the revised scale correlated similarly with the Big Five Inventory, in comparison to the original scale. Equally, the FC score was positively associated with engagement in collective action and general interest in politics. Additionally, in the same vein as the original scale, there were some demographic differences: respondents with higher

FC were a little more likely to be women, of higher status, have higher income, or to be more left-wing oriented. However, there was no age-related effect. The results of the confirmatory factorial analysis are shown in **Figure 4**.

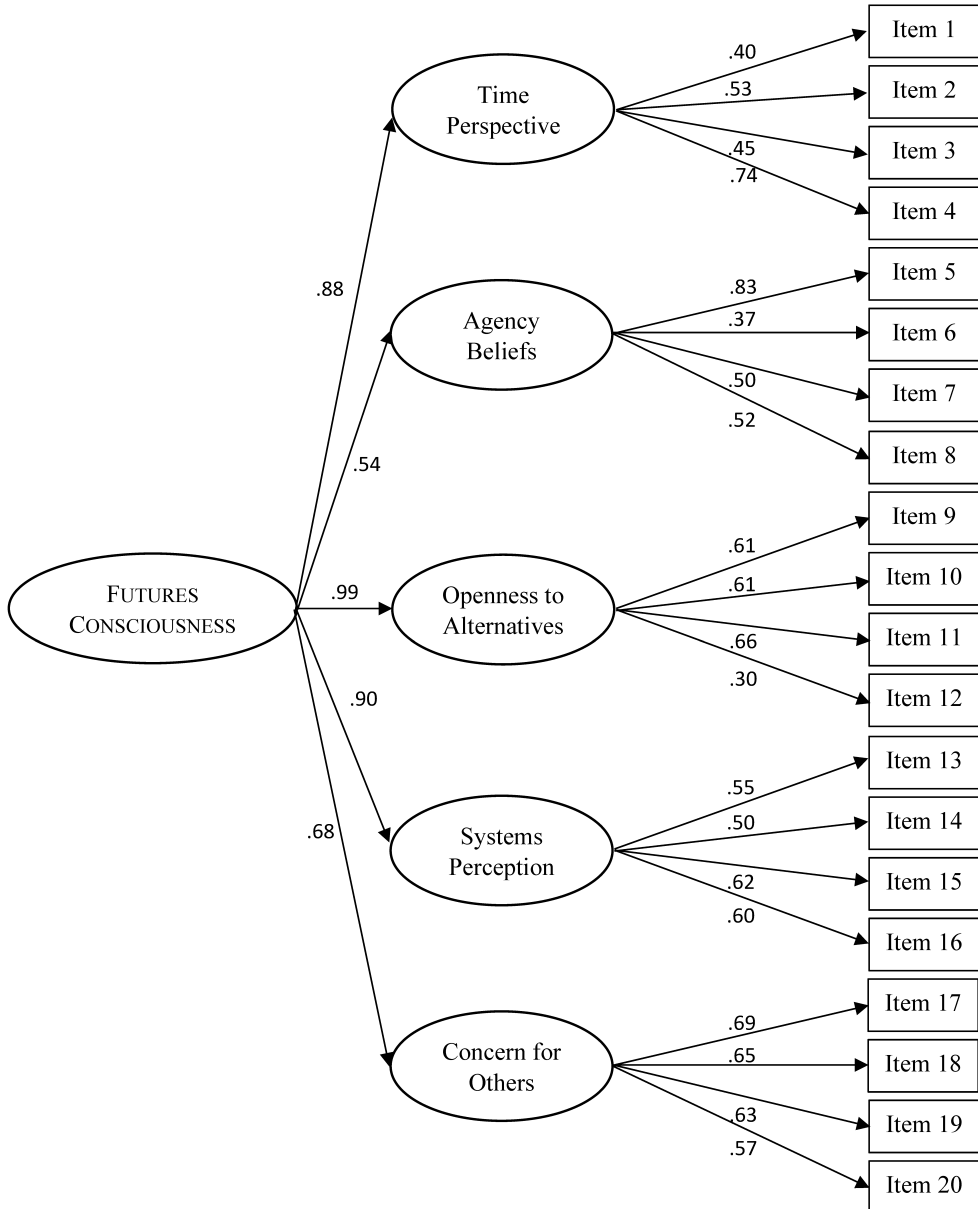


Figure 4: The results of the confirmatory factorial analysis of the revised 20-item five-factor model. Loadings are standardised (completely standardised solution) and are all significant at $p=.002$ or smaller (Article IV).

5.4 Using the FC Scale in a mixed-method research design

Article V describes a mixed-method study on the Finnish elite’s preferences for potential future policies for sustainable consumption. The Futures Consciousness Scale was used as a tool in analysing the motivations and arguments of the participants. The analysis proceeded in three phases: clustering the participants into groups, testing the Futures Consciousness profiles of the members in these groups, and qualitative analysis of their interviews.

5.4.1 Clustering the participants

The cluster analysis, based on the respondents’ evaluation of the fourteen consumption policies (see Table 7, Chapter 4), resulted in the identification of three different respondent groups. These were named sceptics, moderates, and progressives. As the names indicate, the progressives were more in favour of the presented policies, whereas the sceptics favoured them the least. The moderates’ views were similar to progressive views on enabling and informative types of policies as well as on some disabling policies that could be interpreted as more traditional (such as taxes). However, regarding more invasive and radical disabling policies, such as quotas and restrictions, the moderates’ views echoed the opinions of the sceptics. The assessments by the different respondent groups are shown in **Figure 5**.

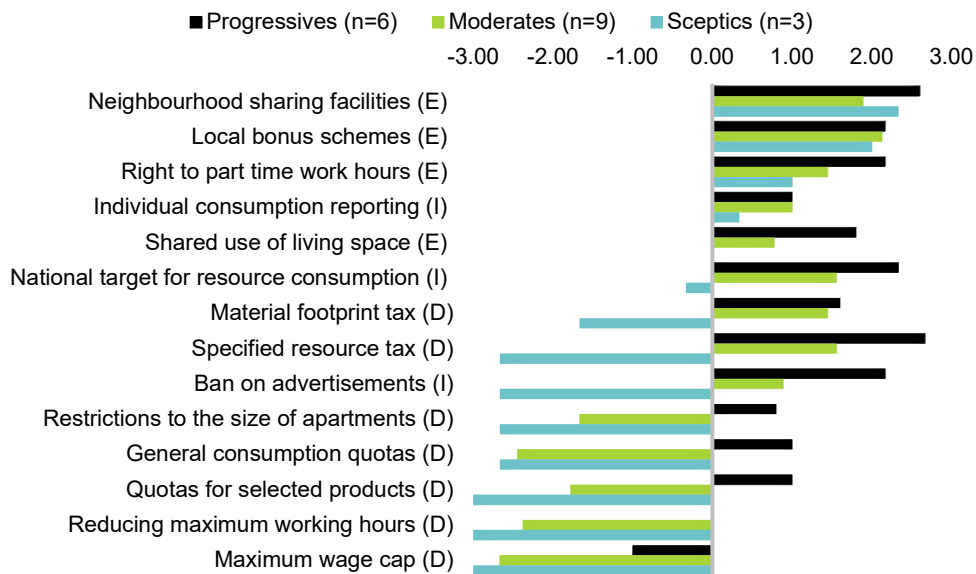


Figure 5: Acceptability of enabling (E), informative (I) and disabling (D) consumption policies by respondent groups. Table published in Article V.

5.4.2 Futures Consciousness profiles

Average scores in the five dimensions of Futures Consciousness were calculated for each respondent group. **Figure 6** shows the scores in the five dimensions, including selected subdimensions: openness to alternatives is divided into two subdimensions, ‘critical thinking’ and ‘openness to experience (ONE)’, and time perception is divided into two subdimensions, ‘future orientation’ and ‘consideration of future consequences (CFC)’. These subdimensions are used to demonstrate the variation between the respondent groups.

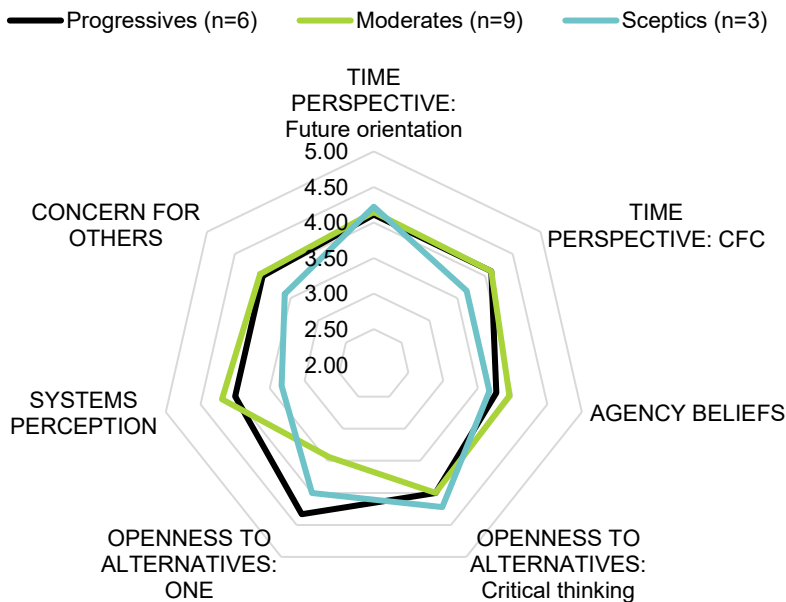


Figure 6: Futures Consciousness scores of the three respondent groups.

The average FC score for progressives and moderates was 4,0, while for sceptics it was 3,7. In terms of the five dimensions, the scores for progressives and moderates were quite similar, except in the openness to alternatives subdimension ONE. The ONE score, which represents an individual’s creativity and unconventionality, was notably higher among progressives than moderates. On the other hand, the FC score of the sceptics group clearly differed from the two other groups: they had a notably lower score in systems perception, concern for others, and time perspective subdimension CFC. Interestingly, their openness to alternative subdimension ONE score was much higher than the moderates’, and in critical thinking, their score was the highest of all three. It should be noted that due to the small ‘n’ of this study these results are descriptive and not to be considered statistically relevant.

5.4.3 Interview analysis

Despite all respondents sharing the urgency of sustainable consumption, their approaches towards the use of policies were different, as was already demonstrated above. The qualitative analysis of interviews shed further light on the differences in values and motivations between the three groups. A summary of this analysis is presented here.

The progressives were optimistic and saw plenty of opportunities and positive signals around them. For them, radical changes were inevitable, and they believed in general support for even notable systemic reforms. They played with ideas of alternative developments and emphasised creativity in finding solutions to support new, sustainable lifestyles that are easy and simple. During the interview, they would bring up many, already existing examples of good practices.

“I am optimistic because, you know, this younger generation and how these trends progress – they are the pioneers and then our consumption patterns will with speed, diets will change to vegetarian with speed.”

“The evolution works, youngsters, schools and others are already very active. – It just has to be easy to make right choices in the everyday life. I believe Finns have ‘talent in their attitudes.’”

“We have to be innovative and search for disruptive alternatives.”

The moderates were more concerned about consequences, how various policies could cause distress to individuals. They were also more pessimistic in their evaluation of public support for radical changes and of the political system to bring about such changes. They emphasised the need for motivation, education, and awareness-raising, as well as slow-but-steady progress.

“Such huge changes would require many sacrifices from people.”

“I do not doubt that we could do it. – We need missionaries. – This nation is wise enough without strong [legislative] policy measures. – We need a passion to create a new world.”

“It depends on political will. Yes, sure, there is paper and pen and the parliament, so we can do anything.– But very radical means are not politically possible. It is the same as with the climate change that unless there is commonly understood force majeure, the political decision-makers do not sign up for strong measures.”

The sceptics found vast radical reforms risky and problematic for equality, welfare, and political stability. They considered the required changes to be in fundamental conflict with the current economic and social system. For them, changes were a

necessity, not an opportunity. Strong policy measures were seen to present the past, not the future. They emphasised the role of science and the development of new solutions over time.

“Bringing down consumption levels is just so difficult. Maybe we should first start by trying to stop it from going up and then figure out how to get it to be negative and still keep economy going. – Strong targets cause counteractions, and then things get polarised and then comes, as we can see now in the US, what polarisation can lead to.”

“We should find a way to improve step by step, and not dabang, like we are all making everything ourselves and cultivating everything ourselves and all rooftops are full of this and that.– There comes the challenge of meeting everyday realism with ideology – and the gap gets too big and the camel’s back breaks. – We should find the golden middle road that we could all agree on, I believe it is possible.”

The comparison of the interview data with the results from the FC Scale clearly indicates that the openness to alternatives dimension plays a central role in the respondents’ evaluation of policy acceptability. Progressives, who also had very high scores on openness to alternatives, used their imagination and creativity to spot signals in their environment that support swift and radical reforms. They saw opportunity and potential alternatives to the present despite many challenges, and hence, they were also more supportive of new, even radical, policies. In the responses by moderates and sceptics, this strong sense of imagination and creativity was absent. However, the sceptics also had a high score in openness to alternatives, but more so in the critical thinking subdimension. This goes together with their tendency to spot risks and potential problems resulting from reforms.

The opposition of the sceptics towards radical policies may be further understood by comparing their interviews with their scores in the other dimensions of FC: consideration for others, systems thinking, and CFC, a subdimension of time perspective. Lower scores in systems thinking¹⁰ and concern for others may indicate that the suggested policies were more in conflict with the respondents’ worldviews and values compared to the other two groups. For example, their emphasis on the anguish of individuals focused on Finnish citizens and the problematic consequences of changes in the Finnish economic and political system. Their concern had less of a global focus than others. Furthermore, their lower score in CFC, is in line with their emphasis on how science and research can provide better solutions in the future.

¹⁰ The systems thinking dimension includes the aspect of the eco-psychological self, and the scores of the respondents were especially low in those items.

They find it less acceptable to use potentially difficult solutions now, as they believe that better solutions will be found later.

Finally, the interview data reflects interesting variation in the systemic perception among the respondents. Even though both progressives and moderates had a high score in systems perception, there was a clear difference in how they perceived systems. The progressives emphasised how the systems can be changed and how they are the enablers of new lifestyles. The moderates, on the other hand, saw systems as boundaries that should not be crossed, as the consequences may prove unpredictable. They sought solutions that hold the current balance of the system and policies that would be in line with present practices.

5.5 Reflection of the results: definition of Futures Consciousness as an anticipatory capacity

5.5.1 Futures Consciousness as a capacity of an individual

The work on the definition of Futures Consciousness on the basis of a review and analysis of futures research literature on future-oriented thinking and capacities resulted in the identification of five dimensions: time perspective, agency beliefs, openness to alternatives, systems perception, and concern for others. Further research on the development of the psychometric scale to measure these five dimensions in individuals showed that, together, these five dimensions actually do describe a psychological phenomenon, which we have dubbed Futures Consciousness. In other words, the results of the psychometric scale showed that individuals with high scores in one dimension were more likely to score high in the other dimensions as well. The concept of Futures Consciousness, hence, can be used to identify variations between individuals, variations that describe their beliefs, biases, thinking habits, and assumptions that then serve to enable or constrain how they see and interpret information while forming their images of the future. In the light of the above, Futures Consciousness was defined in the following way:

Futures Consciousness is the human capacity to understand, anticipate, prepare for and embrace the future. It can be considered as the multiple processes that influence, firstly, how one projects the self and its social surroundings in potential futures, in order to actively adapt oneself to it when it will become the present; and secondly, how one projects potential futures and adapts their present actions to bring about the ideal future. Furthermore, the five dimensions of Futures Consciousness describe the individual differences that affect these processes. (Article II)

Regarding psychological theory, the concept of Futures Consciousness is defined in terms of self-awareness and self-regulation theories (Markus & Nurius, 1986; Carver & Scheier, 1981), which bear similarity with the feed-forward/feedback learning loop discussed in section 3.23.2. Futures Consciousness could be seen as the multiple processes that allow one to project oneself and one's environment to the future and then adjust their behaviour and projections accordingly. Thus, it is not only a projection of oneself to an ideal self in the future, but also the projection of one's current conditions to an ideal state in the future, which both guide one's actions in the present.

As mentioned above, Futures Consciousness was defined as a capacity, i.e. “the potential of an individual for intellectual or creative development” and “inborn potential as contrasted with developed potential” (APA Dictionary of Psychology). Furthermore, its dimensions were described utilising approaches from social and personality psychology, and hence, it is *a mix of individual differences and contextual flexibilities*. In other words, Futures Consciousness includes aspects of enduring personal characteristics *and* abilities that change according to contextual changes. This again reflects the possibility for an individual to develop these qualities over time. Compared with many of the approaches to future capabilities and capacities discussed in section 3.2, Futures Consciousness is not defined as a skill, i.e. something that must be learned. In that sense, it is something more akin to a quality, feature or characteristic of human personality. However, as humans change and develop over time, life experiences as well as education may develop these qualities.

5.5.2 Futures Consciousness as a generic human anticipatory capacity

In the articles presented above, Futures Consciousness is defined as a psychological capacity of individuals. In this section, I suggest a more generic definition of Futures Consciousness as an anticipatory capacity of a human system, be that system an individual, an organisation, a nation, a culture, or something else.

As was described in section 3.3, for a human system to be able to recognise and process different kinds of information to produce, explore, evaluate, and update its predictive models, it must be able to carry out certain functions. These cognitive functions are affected by the qualities of the system, such as values, beliefs, and biases. In particular, these qualities influence how the predictive models of the system turn out to be. These qualities form our Futures Consciousness. Futures Consciousness consists of individual properties pertaining to each system, properties that may vary greatly from system to system. There are five main dimensions to these qualities:

1. The way the system understands time. How far into the future it projects its predictive models and how well it understands the relationships between past, present and future actions.
2. The way how the system sees its own agency. How far it believes in its own ability to influence the way the predictive models are and to take action to realise them.
3. The way the system understands relationships between different systems. What kinds of links and interdependencies between different systems it is able to recognise and act on.
4. The way the system understands its own role in relation to other systems. How far it sees the impacts of its own actions and how responsible it feels for these impacts.
5. The way the system sees future possibilities. How far they see them as open, full of potential for novelty and alternatives to the present.

A suggestion for the relationships between the five dimensions is shown in **Figure 7**. Two dimensions lay the cognitive-motivational foundation for exploring images of the future: time perspective and agency beliefs. The former enables the understanding of sequences of time and the concept of the future, while the latter provides the motivation to consider possible futures. The following two dimensions, systems perspective and concern for others, broaden the images of the future from self-orientation to larger entities, such as social and natural systems. Furthermore, they deepen one's understanding of their interdependencies and the inclusion of the welfare of others as a part of one's own welfare. All these dimensions are bound together with openness to alternatives, the understanding of the future as open and unpredictable. In addition, time perspective and systems perception are linked together by their emphasis on sequences, consequences, and causalities, whereas agency beliefs and concern for others are linked together by their focus on actions and their impacts.

In the light of the above, I propose the following definition for Futures Consciousness as a generic anticipatory capacity of humans and human systems:

Futures Consciousness consists of the individual qualities of a human system that influence the way in which it can produce, explore, evaluate, and update its predictive models/images of the future for itself and its environment. The five dimensions – time perspective, agency beliefs, systems perception, concern for others, and openness to alternatives – describe variations between the qualities of different systems affecting the anticipatory process. Over time, as a result of learning, these qualities of the system may change.

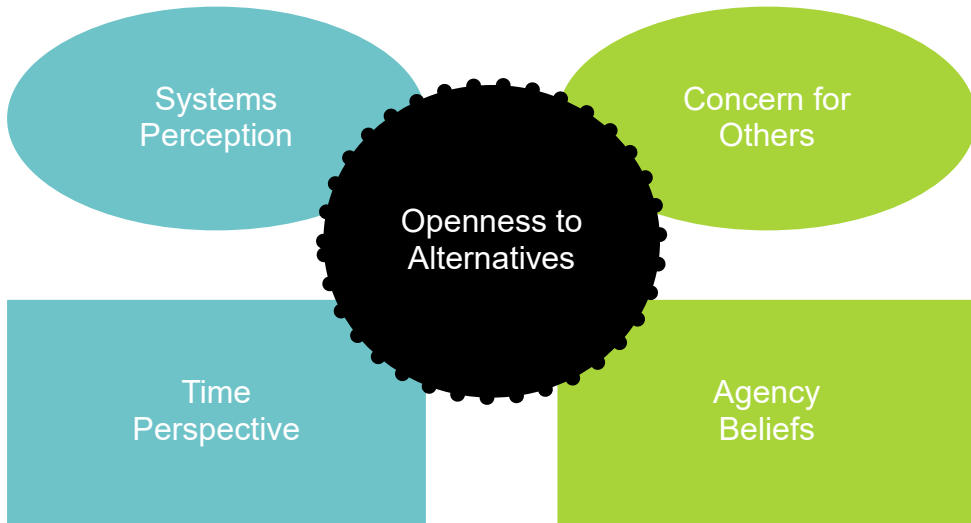


Figure 7: Relationships between the five dimensions of Futures Consciousness.

6 Discussion

The aim of this dissertation was to establish how one could define and measure Futures Consciousness. The previous chapters described the conceptualisation of the term through the five-dimensional model of Futures Consciousness (FC). This model was further operationalised with a psychometric scale that measures the manifestation of Futures Consciousness among individuals. Furthermore, the concept of Futures Consciousness and the FC Scale were applied in an empirical mixed-method study of elite attitudes. And, finally, the concept was embedded in the context of anticipatory systems and individual differences as descriptions of anticipatory capacities.

The interdisciplinary work done in this research has brought more light to the vast amount of research already done on future-oriented thinking in the field of psychology. It provides futures research scholars with tools from personality and social psychology that have been underutilised in futures research. However, the results presented here have their strengths and weaknesses, and in the following sections, I will discuss in more detail their contribution to research, the limitations of the approach, and potential directions for further research.

6.1 Contribution to (futures) research

In an overview of psychological approaches to future orientation, Seginer suggests the division of these approaches into two: *athematic* and *thematic* (Seginer, 2009, p. 3). *Thematic* approaches include research approaches that study the events, experiences and other objects that represent future thinking or are the result of it. *Athematic*, on the other hand, include approaches that consider only the structural dimensions of future thinking, regardless of the context or situation. Expanding Seginer's thoughts to the field of futures research, I suggest that there are two similar main approaches. *Thematic futures research* studies the potential contents of the future, such as potential future events and developments, scenarios or images of the future. It aims to respond to the question "What could the future look like?" *Athematic futures research*, on the other hand, studies the structures and processes that use or produce future images, such as the composition of participants or different stages of scenario processes, or the capacities required in them. The question here is "How are future images produced and used?" This dissertation contributes to the *athematic* approach in both fields.

Most significantly, the work presented in this dissertation establishes a connection between five different dimensions: time perspective, agency beliefs, openness to alternatives, systems perception, and concern for others. Together, these form the integrated concept that is referred to as Futures Consciousness in this dissertation. The systematic review of different approaches to future thinking and the resulting conceptualisation that combines these different, yet interdependent, perspectives into one well-defined concept provide a substantiated base for the further exploration of the significance of future thinking. The development of the FC Scale confirmed that Futures Consciousness is not just a theoretical model: the phenomenon actually exists among individuals and it can be measured. The results of the tests with the psychometric tool empirically corroborated that the five dimensions are interlinked: an individual who is strong in one dimension is likely strong in others as well. Moreover, the predictive validity of all the dimensions together was higher than any one of them alone. In other words, individuals who are strong in all five dimensions are more likely to behave in ways that seek to influence the future than individuals who are strong in only one of the dimensions.

Within psychology, the concept of FC provides some novel elements to the traditional view on future orientation, which typically focuses on time and agency. It connects them to an experience of change, the ability to make systemic connections and consider alternative futures in the plural. It also highlights the focus on wider societal and environmental responsibility beyond the future of a solitary individual. Consequently, there is a substantial potential for conceptual synergy and research collaboration between psychology and futures research on these issues.

In terms of futures research, I will discuss in more detail the implications of these results in terms of anticipation theory and futures capacities, education, and foresight practices, as well as in attitudes towards change.

6.1.1 Anticipation and futures capacities

The development of a short, simple, and clear definition of Futures Consciousness contributes to the active discussion on future capabilities and capacities, a discussion that still lacks commonly accepted and widely shared, scientifically solid definitions (see chapter 2 for an overview). Since the FC concept is based on an analysis of futures research literature, it should well reflect the thinking among the actors in the field.

Defining FC as a capacity differentiates it from many other similar concepts. It is not a skill or a competence that can be taught, nor a special capability that can be activated only among selected individuals. It is an inborn capacity that can be developed among all humans, although some of us may possess stronger tendencies in some of the dimensions. As a capacity, it encompasses a set of basic assumptions that humans make during anticipatory processes that describe our tendencies to explore, recognise, reflect, and process different kinds of information. Furthermore, it

identifies differences between individuals, based on their personal dispositions and characteristics. Relative to other similar concepts, FC could be understood to describe the capacities behind the development of future skills and competences, such as futures literacy.

The framing of Futures Consciousness as an anticipatory capacity that influences the feed-forward feedback process of anticipation contributes further to the discussion on the conditions that enable optimal anticipatory processes. FC can be considered as one proposition to describe the set of five “interpreting codes” (Poli, 2017, p. 203) of an anticipatory system: how they interpret time, agency, alternative options, systemic links, and the interests of others but themselves. Similarly, the dimensions of FC could be understood as a description of a set of “anticipatory assumptions” (Miller, R. et al., 2018) that influence how differently the future is used and produced by an actor: what do they assume about time, future, past or present; what do they expect themselves to be able to influence and change, do they see the future as open or closed, which systemic interdependencies they take into account, and who are the actors whose futures they are concerned about.

Empirically, the development of the FC Scale provides the study of futures capacities with a psychometrically validated tool that can be used in multiple ways. The measure is short, easy to manage, and simple to interpret. It can be applied in many contexts, situations, and spheres of life. Amidst the calls for more rigorous approaches in the futures field (Minkkinen, 2020, Hines & Gould, 2013), this contribution offers new avenues for both theoretical and empirical futures research.

6.1.2 Futures education and foresight practise

According to Bell (2003, p. 75), futurists should aim to teach members of society about futures studies principles and future thinking so that they can make better decisions and consequently improve their lives. The conceptual development of FC and the psychometric scale present a new approach to the study and realisation of this educational endeavour.

In terms of educational practice, the five dimensions of FC provide a framework for teaching different future skills and competencies. Despite many initiatives, no commonly accepted curriculum of future competencies exists (See e.g. Pouru-Mikkola & Wilenius, 2021 for an overview), and many educators currently rely on their own judgment to determine what is relevant. The five dimensions of FC offers one starting point. In addition, the individual profiles resulting from filling in the FC Scale can be used as a tool in teaching¹¹, discussing the different dimensions with

¹¹ Several educators have already used the FC Profiles in their projects through the Futures Consciousness Profile Database at <https://futuresconsciousness.utu.fi>.

students, and reflecting on their own results. By studying one's own profile, one can become more aware of one's own biases. For evaluation purposes, the FC concept and scale can also be used, for example, to study the impacts of education or assess the contents of curricula.

Similarly to education, the FC concept and scale can be used as a tool in foresight practise and the evaluation of the process. The FC Profile can help in raising awareness of the differences in how participants approach the future and support their individual development during the process. Furthermore, facilitators of foresight processes may try to ensure that participants with different profiles are included in the process. In terms of evaluation, the FC concept could be used as a basis for the normative analysis of images of the future as results of foresight processes. Analysing the contents of these future images can reveal the kinds of qualities the system has been able to utilise in building the images, and, for example, whether the five dimensions of FC are present in them. Finally, the FC scale can be used to measure the impact of a futures intervention or foresight process on its participants.

6.1.3 Understanding motivations for change

Since the future does not repeat the past, futures research often focuses on the study of change and transformation. As global sustainability problems grow, the calls for radical transformations continue to increase (See e.g. McPhearson et al., 2021; Ahvenharju, 2020). Since the role of individual actors as change-makers is crucial for the processes of transformation (Grin, Rotmans, & Schot, 2011) the findings of this dissertation on the acceptability of radical policies in the eyes of elite members may shed light on their motivations. The results of article 5 indicate that differences between actors' systems perception and openness to alternatives – and their subdimensions – explain many differences in their attitudes towards change. Elite members with higher systemic perception seem to pay more attention to how change could take place with the least disruption to the system, whereas elite members with high openness to alternatives seem likely to look for paradigm shifts and radical solutions. To find broad support for radical transformation, these different motivations must be understood and addressed.

In general, the psychological concepts included in the FC concept can be used to understand and explain many future-related psycho-social phenomena. All of the five dimensions of the Futures Consciousness concept have their equivalents in psychology, and they can also be used individually in analysis. In the following example, some of the dimensions of Futures Consciousness are used to explain a known phenomenon related to images of the future.

When Rubin (1998) studied the images of the future of young Finns in the mid-1990s, she noticed an interesting dissonance. When asked about the personal images of their future, the young people were optimistic, and their futures were filled with

positive expectations. However, when asked about the future images of Finnish society or the entire planet, their images were grim and full of apocalyptic visions. The tendency of individuals to dichotomise personal and societal future images has been identified in other studies as well (see e.g. Ono, 2003; Hicks, 1996; Rothstein & Lake, 1975).

The dissonance between personal and global futures could potentially be explained – and addressed – with the concept of Futures Consciousness, at least in two different ways. First, the tendency of being optimistic about one's personal future despite grave societal problems could speak of a strong belief in one's own agency and ability to influence at least one's personal future and bring about positive outcomes. Second, it could be explained by weak systems perception, i.e. that an individual is incapable of seeing the interconnections and overlaps between societal and personal future realms. Both explanations provide fruitful avenues for futures education.

First, increasing systemic understanding among individuals should help them include global trends and challenges in their personal future images. Reducing the dissonance between the two and introducing more subjectivity to the challenges could make for more integrated future images. However, once people become more aware of global problems, depression and anxiety are more likely to take over. And here is where the second aspect comes into play: increasing our understanding of our agency, of our own – albeit limited – possibilities to act and influence future outcomes, is a central cure for that anxiety. Supporting agency by raising awareness of how systems can be changed and where efforts may yield results increases realistic expectations of our own potential to act and have an impact.

6.2 Limitations of the FC approach

One limitation of the FC concept may reside in its name, where Futures Consciousness is used to describe general future attitudes and awareness. Within that concept, the word 'consciousness' is not used in the same way as in the consciousness research conducted in cognitive psychology and neuropsychology. Readers who expect our work to explore and define future consciousness as a type of human consciousness will not find what they are looking for, which may lead to conceptual misunderstandings. While other terms than consciousness were considered, as is described in section 2.3, none were found as suitable in portraying such a complex phenomenon that encompasses an undetermined mix of human motivation, emotion, and cognition. Despite the name, most limitations of this work are related to two main aspects: how the model and the psychometric scale were developed and the potential built-in bias and normativity of the concept.

6.2.1 Modelling and measurement

Models are always abstractions and capture only some aspects of a system. They are simple tools that improve our understanding of something that is much more complex in reality. It should be emphasised that there were several points in the process – when the five dimensions were originally identified – where the decisions made during the analysis were based on the researchers' interpretations of terms and the meanings behind them. Other outcomes could also have been possible. Furthermore, it is important to recognise that the dimensions were identified on the basis of definitions of future-oriented thinking by futurists. If the dimensions had been selected on the basis of psychological research on future-oriented thinking, the result could have been different. The relevance of the five dimensions was, however, validated in the next phases of the project.

Concerning the five-dimensional model, it could have potentially included more dimensions. For example, when developing the scale, there was no existing scale to measure moral centrality. Instead, the Virtuous Leadership Questionnaire was included in the test to see if it could grasp something akin to moral centrality. As a result, two items from that questionnaire formed a factor of their own that emphasised risk-taking. Since the scale was originally included to replace a missing scale on moral centrality, but instead emphasised aspects such as leadership and risk-taking that were not originally included in the FC, these items were discarded. More research could have revealed that leadership and risk-taking could represent a dimension of their own.

Similarly as with a model, a psychometric scale can only provide a narrow representation of a complex concept. Individual Futures Consciousness is surely a much broader phenomenon than what the scale is able to grasp. And, again, the selection of relevant psychological constructs for the development of the scale was based on interpretations made by the researchers and how they understood the meaning of the five dimensions identified in the first article. Decisions on what to include and what to leave out were, in this case, also vulnerable to bias.

Another limitation is the fact that the scale was developed on the basis of other existing psychometric scales, which limited the available options for scale items and influenced the way in which some dimensions were measured. For example, in the case of moral centrality and holistic thinking, both concepts were left out from the scale because no existing scales were available. In addition, agency beliefs are currently defined as an actor's beliefs about their capability to achieve their own personal goals by themselves, thus featuring a strong individualistic emphasis. This choice was influenced by the existence of well-established and validated scales, while choosing to emphasise a more collective perspective could potentially have necessitated the development and adjustment of new items. As was already described earlier, similar problems in the original scale with systems perception items were eventually solved by developing completely new items for the revised version of the scale.

6.2.2 Bias and normativity of the FC concept

Although not intentional, the FC model and its psychometric scale feature some aspects of normativity as well as bias. Some of this is due to the method we chose. The dimensions were derived from definitions of future thinking, which in most cases were prescriptive rather than descriptive. Hence, the five dimensions describe elements of good or preferable future-oriented thinking, not just any future-oriented thinking. Interestingly, many test-users have pointed out the normativity of the Concern for Others dimension. However, one could argue that preferring to think ahead, having faith in one's own agency rather than fate, and considering alternatives to the present are all normative judgements. Just as individuality, empowerment, and equality – values implicit in some of the dimensions – are central values in futures research, so is concern and care for the future and future generations. As futures research has always featured a strong emphasis on values (see e.g. Bell, 2003), it would seem unreasonable to create a value-free concept of future consciousness. Despite this normativity, an interesting finding is that, according to the empirical evidence gathered in connection with the psychometric scale, all five dimensions do go together in the minds of individuals.

This brings us to the other potential limitation of the psychometric scale: in some of the results, people with a leftist political orientation were more likely to score higher on the FC Scale than those oriented towards the right. This result was not strong enough to draw any definite conclusions, and more research would be required to verify it. The potential bias of the scale is intriguing: by all accounts, one would expect individuals to be futures-conscious irrespective of their political beliefs or ideologies. However, studies on some of the constructs used for the scale, for example openness to new experiences and self-transcendence values, have identified tendencies towards liberal bias (Caprara et al., 2017; Carney, Jost, Gosling, & Potter, 2008). Additionally, in a study on future orientation focusing only on the time perspective aspect, individuals with a higher tendency for future orientation were also more oriented towards the left (Rapeli, Bäck, Jäske & Koskimaa, 2021). This indicates that political tendencies are not connected only to personality traits or values, but also to time perspective. Most research on this, however, remains inconclusive.

A further potential source of bias is the fact that in the predictive validity testing, pro-environmental and politically active behaviour were considered examples of future-conscious behaviour. Although both examples are typically used in similar tests of future orientation, both behaviours may also contribute to the aforementioned liberal bias. Identification of other types of future-oriented behaviours with a more conservative angle could increase the validity of the tests.

Finally, the scale was developed with a test audience from Western countries, and its potential cultural biases have not yet been accounted for. It is possible that, in some other cultures, the five now-identified dimensions are not central to their future

consciousness. Instead, only some of the current dimensions could be relevant, or some totally new dimensions would be required. This can be determined only through further studies. A comparison could be made here to the Big Five model of personality traits, which has been found to be valid in several cultures and societies around the world (Schmitt, Allik, McCrae & Benet-Martínez, 2007). However, some doubts have been cast due to the fact that the model has often been validated with literate and highly educated individuals who may be culturally closer to their international counterparts than to their local compatriots (Gurven et al., 2013). Interestingly, a study among the Tsimane indigenous people of the Bolivian Amazon failed to find support for the five personality factors, hence indicating that the model may not be universal (Gurven et al., 2013). In the case that the five-dimensional model of FC is found valid across different cultures, it would allow closer study of the differences between the levels and dimensions of FC between and among cultures.

6.3 Directions for further research

There are numerous ways this research could be taken further. Here, I will concentrate on three aspects: the concrete development of the FC model and scale, further study on Futures Consciousness and future thinking in general, and research on the development of Futures Consciousness.

6.3.1 Development of the FC concept and scale

Both conceptual and psychometric development of the Futures Consciousness concept should continue. Further research would be useful at the conceptual level of the five dimensions, both statistically regarding the psychometric scale and empirically on the impact and relevance of the FC concept.

As mentioned previously, the current dimensions of FC could potentially be complemented with more dimensions. For example, the study on the Finnish elite showed that there were relevant differences among respondents in the subdimensions of FC. Another possibility could be to include emotion regulation as a dimension to strengthen the extent to which the concept captures emotional capacities. The identification of new dimensions would require both theoretical and empirical research to validate them. The scale could also be developed to include a more comprehensive set of items to address all the five dimensions. For example, the aspect of holistic thinking remains underdeveloped.

Regarding the items and psychological constructs used to measure the agency beliefs dimension, the possibility to broaden the approach towards a more collective conceptualisation is something that could provide interesting new possibilities. Currently, the focus of general efficacy conceptualisation is strictly on individual interests and self-realisation; however, other alternatives that consider individuals'

faith in the power of collective action in achieving collective goals, such as outcome expectancy or collective efficacy (Koletsou & Mansy, 2011), might also fit well in the FC structure.

Further research on the validity of the FC Scale could address the questions of liberal bias as well as test the predictive strength of the concept compared to other similar scales. Currently, we know it predicts future-oriented behaviour, but does it perform better than other measures? Furthermore, the validation of the scale in non-Western cultures is necessary to study its global applicability. A widely validated scale would allow international comparisons of FC between cultures, societies, and regions.

In terms of international applicability, further translations of the scale would make the tool more widely accessible to different audiences. In addition to the English, Finnish, and French versions presented here, an adopted scale suitable for teenage respondents is currently being tested in English, Italian, Dutch, and Turkish.

Finally, the conceptual development of applying the FC concept and FC Scale to larger entities, such as groups and organisations, could open new avenues for research and complement the current concept. In addition, the FC concept could be especially useful in different types of qualitative analyses of future images, be they organisational foresight reports or national visions for the future.

6.3.2 Further study on Futures Consciousness and future thinking in general

As the current results from the UK sample presented in article 4 show, there were some demographic differences associated with individuals with higher FC: they were somewhat more likely to be women, of higher status, higher earners, and left-wing oriented. Further studies with large population samples would enable more detailed study on these and other potential differences. This could help in understanding the preconditions that enable or prevent the development of high or low FC.

Another approach for developing general understanding of how FC develops could be through a qualitative comparative study on future images with the help of the FC model. A mixed-method approach to combine the analysis with individual FC profiles could help shed further light on the development of individual thinking.

As mentioned above, the initial results from the UK sample showed a connection between political orientation and future orientation or Futures Consciousness. The potential evidence for this was discussed in section 6.2.2, but the results are not conclusive. Since the findings are relatively small, it is possible that the method or population sampling is biased or that fewer people with a right-wing political orientation and high future time perspective respond to these types of surveys. However, there is evidence of political orientation being connected to openness to experience – one of the subsets of the openness to alternatives dimension of FC – as

well as some other personality traits (Furnham & Fenton-O'Creevy, 2018, Jost et al., 2003). The validation and significance of this link would require more attention. In addition to political orientations, the connection between FC and an individual's trust in political systems and other people also deserves further research. Recent results show a correlation between higher trust and FC (Lalot, Abrams, Ahvenharju, & Minkkinen, 2021), which is in line with other research on future orientation (Rapeli et al., 2021; Knudsen & Christensen, 2021). However, opposing results have also been reported (Christensen & Rapeli, 2021).

Yet another avenue for further research would be to study the connections between FC and behaviour. It should be noted that the five dimensions of FC include individual cognition, emotions, and motivation, but they do not assess behaviour. This way, the concept can be used to predict and study behaviour in different empirical settings. Although it may be too daunting and questionable a task for researchers to prove that strong FC leads to better predictive models or images of the future, its impacts on decision-making or other types of behaviour could be studied. The concept of the value-action gap (Chaplin & Wyton, 2014) describes how values often do not translate to behaviour, hence testing the impacts of FC on behaviour would be important. A recent study in the UK has already showed that individuals with high FC had higher resilience to endure the challenges of COVID-19 lockdowns (Lalot et al., 2021). Further research on potential connections between FC and future-conscious behaviour and action is needed to establish whether our images of the future really do have an impact on our actions, as was discussed in chapter 3.

6.3.3 Development of FC as a capacity

The FC concept was developed to encompass and reflect the potential for change and development. While there are some personality traits that are not considered malleable, the psychological concepts included in the FC definition should all be such that they can potentially change as a result of experiences or learning. The FC Scale, however, has not yet been tested for its ability to track such changes and whether it could be efficiently used to evaluate the impacts of different types of interventions. Establishing the usefulness of the scale to study changes in individual capacities of Futures Consciousness would open up several possibilities for research in the development of FC.

As there are numerous different types of futures interventions, such as workshops, futures courses, and futures schools, the evaluation of these activities is crucial. However, even though future thinking may be a malleable feature, some research results suggest that it cannot be easily changed (see e.g. Kulha, Leino, Setälä, Jäske & Himmelroos, 2021). Hence, more research would be needed to identify which kinds of interventions would have an impact.

7 Conclusions

The work presented in this study is the result of a collaboration between social and personality psychologists and futures researchers aiming to bridge the gap between the disciplines in order to explore the concept of Futures Consciousness, especially at the individual level. In this conceptualisation, Futures Consciousness is defined as an anticipatory capacity that can be operationalised at both the individual and collective level through consistent dimensions. At the same time, it is not domain – nor situation – specific, but a more general capacity that persists across various situations and over time, and is present in various life domains, such as work, education, and family, as well as in responses to global issues. As such, studying and measuring individual variations in Futures Consciousness could prove helpful in education, governance, capacity building, business development, research, and in answering the following questions: what kinds of assumptions and biases do people have when reflecting on the future? What kinds of aspects motivate them to change their futures? What kinds of futures education and foresight processes could have significant impacts on how participants think? How can we support individual agency and preparedness in the face of an uncertain future? How could and should future thinking be taught to students?

In the face of wicked, challenging global problems, adversities, and doomsday scenarios, we need hope. Studies in recent years among youth have brought attention to climate anxiety: a worrying percentage of young people report being notably stressed and anxious over climate change (American Psychological Association, 2020; Steentjes et al., 2017). Thinking in terms of future images, climate change does provide plenty of fodder for dystopic visions. When the climate school-strike movement Fridays for Future claims the future and dreams of their generation have been stolen, but that it all could still be saved if we manage to unite in action, they replace dystopic images with optimistic visions of agency and change and, hence, offer hope.

The five dimensions of Futures Consciousness provide important perspectives on unknown futures: time perspective helps us to be patient and see how sacrifices today benefit the future; agency beliefs support us in our quest to make a difference in the world by providing confidence and motivation for action; openness to

alternatives reminds us that the future has not yet been made and that there still are many possible alternatives to the grimmest images, maybe even something we have not yet even thought of; systems thinking helps us find solutions that consider complex impacts; and concern for others requires us to consider the futures of others, not only ourselves. And, as many studies show, working to promote the well-being of others is the best source of personal happiness.

The development of the concept of Futures Consciousness was motivated by a need to make better decisions, to find ways to overcome the limitations our minds and thoughts face when considering future alternatives. It was motivated by a need to identify future capabilities and anticipatory capacities that are essential for the creation of future images that include the possibility of realising a better future. The five dimensions – time perspective, agency beliefs, openness to alternatives, systems perception, and concern for others – do, in my opinion, encompass these essential aspects. These capacities enable the formation of more forward-looking, well-grounded, diverse, responsible, and empowering images of the future that, in turn, enable actions and decisions that will help realise these images.

The time has come.

Abbreviations

AB	Agency Beliefs
CFC	Consideration of Future Consequences
CO	Concern for Others
FC	Futures Consciousness
OA	Openness to Alternatives
SP	Systems Perception
TP	Time Perspective
ZTPI	Zimbardo Time Perspective Inventory

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