

Dissertation submitted for the degree of
Doctor of Applied Economics

Leading Entrainment in Organizations

An Exploration at the Individual and Group Level

by

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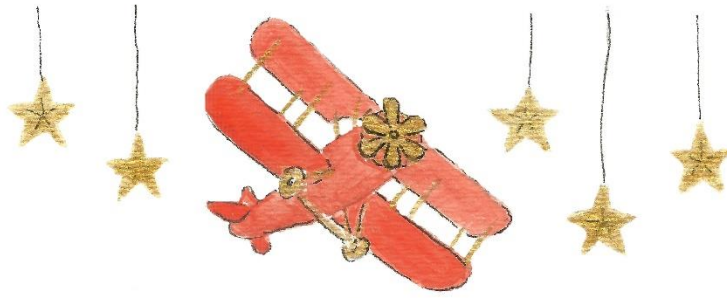
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It is only with the
heart that one can
see rightly; what is
essential is invisible
to the eye

-The little Prince



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Foreword

When I was putting together this doctoral thesis, I came across a picture of the Little Prince from the hand of Christie Renfro (2019). For some reason, the picture got stuck, and I reread his story. Now, let me tell you the story of my PhD journey along some adventures of that Little Prince.

Already in 2008, I laid down the foundation of this thesis and – similar to the storyteller of the Little Prince – showed it to grown-ups. They were not frightened either and advised me to devote my time to something else that matters. Indeed, “grown-ups never understand anything by themselves”, explained the storyteller. Meanwhile, during that summer I experienced something remarkable. As part of a group of people that I never met before, I was able to notice the emergence of group resonance: an elevated emotion, increased sensitivity and mental clarity, flavored with a natural flow of words and deeds. It was magical and at the same time very earthly. What if leaders could achieve this state intentionally in organizations? What would they need? How would this work? This experience inspired me profoundly and convinced me to devote my time in trying to explain this phenomenon to grown-ups. It mattered to me.

Unlike the geographer in the story who could not tell the prince if there are rivers, mountains, and deserts in the world, I have gained myself the impressions and experiences that made up this thesis. Those were only possible with the many people, friends, family and loved ones that I have interacted with on this journey, for whom I have great respect, love, and gratitude. Some just passed by, some stayed, and some left us already. Thank you all. Three persons in particular, my supervisors, were crucial in guiding me to put those experiences into a scientific explanation and doctoral thesis. Thank you too.

It is so true that “it is only with the heart that we can see rightly; what matters is invisible to the eye.” When you do follow your heart and gut feeling, ideally with some rational thinking, you can reach for the stars. This thesis is another proof. However, it showed me that things do go wrong, do move in visibly opposite directions or do not seem to work. As with the lamplighter, it is so important to keep faith and joy in the things we do wherever we are on our journey.

There are still many other lessons that the story of the Little Prince tells us, but that I can tell you another time. Creating this thesis took time too. Although many things came to me, some things needed attention, time and passion for leading to this result. Also, to you, the reader, your time is valuable. Thank you for reading it – preferably with your heart – and may it inspire you as well.

~ Danny

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Nederlandstalige samenvatting

In de 17e eeuw merkte de Nederlandse wiskundige Christiaan Huygens op dat wanneer twee of meer identieke pendelklokken op een gemeenschappelijke balk werden geplaatst die na verloop van tijd identiek begonnen te tikken. Dit fenomeen werd entrainment genoemd, van het Franse werkwoord “entraîner” (meesleuren, trekken). Ondertussen hebben verscheidene disciplines dit fenomeen verder bestudeerd, zoals de natuurkunde en de biologie, vooraleer onderzoekers entrainment gebruikten om het belang van tijd, tempo, ritme en bedrijfscycli in organisaties te benadrukken. Entrainment wordt immers gerelateerd aan betere organisatorische resultaten en wordt gedefinieerd als de "aanpassing van het tempo of cyclus van activiteit aan dat van een ander".

Hoe kan entrainment in organisaties nu bevorderd worden? Meer bepaald, wat wordt er precies verstaan onder entrainment? Welke woordenschat hanteren organisatie-wetenschappers en -experten om dit fenomeen te bespreken? Tot welke onderzoeks-gebieden heeft dit concept reeds bijgedragen om organisaties beter te begrijpen? Hoe kan entrainment in organisaties beïnvloed of gestimuleerd worden om tot betere prestaties en welzijn te komen? Dit zijn onderzoeksvragen die in dit proefschrift worden gesteld.

Tot op heden is entrainment in organisaties voornamelijk besproken geweest m.b.t. de externe omgevingscycli, niettegenstaande de interne activiteiten van een organisatie ook dienen gesynchroniseerd te worden om tot betere resultaten te komen. Bovendien voerden organisatie-wetenschappers aan dat entrainment organisatorische fenomenen kan verklaren die niet voldoende worden verklaard door de huidige theorieën. M.a.w. het concept van entrainment biedt niet alleen een raamwerk om organisatiegedrag uit te leggen en te begrijpen, maar het benadrukt ook het bestaan van nieuwe afhankelijke en onafhankelijke tijdgebonden variabelen, zoals tempo, duur, intensiteit, en fase. Bovendien zijn deze variabelen onderling afhankelijk en met elkaar verbonden, waardoor het belangrijk is om de juiste balans te vinden om tot succesvolle(re) prestaties en strategische veranderingen te komen in organisaties.

Rekening houdend met de vooropgestelde onderzoeksvragen, is het doel van dit proefschrift drieledig: (a) entrainment binnenin een organisatie te verduidelijken; (b) een leiderschapsconcept voor te stellen om entrainment te stimuleren; (c) dit leiderschapsconcept in de praktijk te testen met behulp van een vergelijkend onderzoeksdesign. Hiermee verhelpt dit proefschrift twee grote vastgestelde hiaten in de bestaande literatuur over entrainment in organisaties. Ten eerste was de exploratie van entrainment binnenin een organisatie (ook intraentrainment genoemd) beperkt, hoewel het essentieel is voor betere organisatorische resultaten. Ten tweede is het gebruik van leiderschapsconcepten om entrainment in organisaties te bevorderen schaars, ondanks dat de vaardigheden om strategische keuzes in de tijd te beheren cruciaal zijn, alsook de mogelijkheid om actief deel te nemen aan dit proces of om de verscheidene betrokken ritmes waar te nemen. Of, met andere woorden, in hoeverre kunnen managers worden opgeleid in entrainment management?

Om de doelstellingen te bereiken, is dit proefschrift uit vijf studies die in afzonderlijke hoofdstukken worden besproken. M.b.v. een systematische onderzoeksmethodologie, bestudeert hoofdstuk 2 het concept van entrainment in organisaties binnen de bestaande literatuur om te verifiëren of er een gemeenschappelijk begrip bestaat over wat entrainment in organisaties precies inhoudt (o.a. definities, types, veronderstellingen). Om dit fenomeen verder te verduidelijken en om de lezer een bredere context te geven, wordt ook een thematische analyse van de besproken literatuur toegevoegd. Als zodanig is het doel van dit hoofdstuk om de basis en context van de studies beschreven in de daaropvolgende hoofdstukken te duiden.

Het onderzoek in hoofdstuk 3 verkent intraentrainment op individueel niveau, geïnformeerd door fysiologisch entrainment in de mens. Het is trouwens niet ongewoon dat organisatiewetenschappers vaak concepten lenen die aanvankelijk in andere gebieden waren ontwikkeld om studies van organisaties te verrijken. Dit hoofdstuk begint met de introductie van een algeheel raamwerk van entrainment, de Integrale Entrainment Matrix, om intraentrainment duidelijker te positioneren ten opzichte van andere types. Vervolgens wordt het functioneren van het menselijk hart bestudeerd om aan te tonen dat coherentie een variabele is die waarde kan toevoegen aan de huidige theorie van organisatorisch entrainment.

De studie in hoofdstuk 4 stelt dat het model van spiritueel leiderschap in staat is om dergelijk intraentrainment in organisaties aan te sturen. Ze introduceert eerst een conceptuele verfijning van dit model, geïnspireerd door de entrainment-principes die in het vorige hoofdstuk werden besproken. Vervolgens wordt het mediërend karakter besproken van entrainment in de relatie tussen spiritueel leiderschap en spiritueel welzijn, alsook dat persoonlijk spiritueel leiderschap positief wordt beïnvloed door een effectieve innerlijke bewustzijnsbeoefening en een voorwaarde is voor entrainment tussen personen onderling. Ten slotte, is het mogelijk dat hogere niveaus van persoonlijk spiritueel leiderschap een weerspiegeling zijn van een coherente hartslagvariabiliteit? Als zodanig legt deze studie een basis voor nieuw empirisch onderzoek op het gebied van spiritueel leiderschap en entrainment.

Voortbouwend op het vorige hoofdstuk, evalueren de empirisch studies in hoofdstuk 5 en 6 de voorwaarden en hypothesen van entrainment via spiritueel leiderschap op individueel en groepsniveau. Terwijl de pilootstudie in hoofdstuk 5 dit onderzoekt binnen een academische omgeving, evalueert de studie in hoofdstuk 6 dezelfde voorwaarden bij een professionele dienstverlener waarbij zowel kwantitatieve en kwalitatieve data worden geïntegreerd van zesentachtig deelnemers uit veertien teams. Beide studies bieden ondersteuning dat een innerlijke bewustzijnsbeoefening (bijv. meditatie, yoga, gebed, mindfulness) en coherente interactie tussen de spirituele leiderschapsvariabelen nuttig kunnen worden ingezet om spiritueel welzijn via entrainment te bevorderen.

Het laatste hoofdstuk 7 besluit dit proefschrift met een bespreking van de belangrijkste conclusies in het kader van organisatorisch entrainment. Het benadrukt de bijdragen en de implicaties, voor zowel de theorie als de praktijk, maar ook hoe dit proefschrift helpt om de algemene managementuitdagingen van vandaag aan te pakken als gevolg van de covid-19 pandemie, en, meer specifiek, in strategische verandering. De studies in dit proefschrift zijn echter uitgevoerd binnen specifieke grenzen. Entrainment is alleen onderzocht met een focus op intraentrainment op individueel en groepsniveau. Daarom hield het geen rekening met de invloed ervan op andere types van entrainment, noch van andere niveaus. Entrainment is enkel bestudeerd binnen een academische en professionele dienstverleningscontext met als doel het spiritueel leiderschapsconcept te testen in relatie tot het stimuleren van entrainment in organisaties.

Dit proefschrift omhelst vier concrete theoretische bijdragen. Ten eerste, het onderzoekt intraentrainment en voegt de variabele coherentie toe aan de theorie van entrainment. Ten tweede creëerde dit proefschrift een andere werking en begrip van het spiritueel leiderschapmodel. De derde bijdrage is het toepassen van dat spiritueel leiderschapmodel om intraentrainment in organisaties te stimuleren. Ten slotte biedt de empirische studie in het professioneel dienstverleningsbedrijf verdere ondersteuning aan de theorie van spiritueel leiderschap, en meer bepaald dat een innerlijke bewustzijnsbeoefening een positieve invloed heeft op alle variabelen van spiritueel leiderschap. Daarnaast draagt dit proefschrift enerzijds bij aan de algemene theoretische debatten om meer bewustzijn te creëren voor de integratie van tijdgerelateerde dimensies in toekomstige organisatie- en processtudies. Anderzijds levert dit proefschrift specifieke bijdragen aan het theoretische debat naar meer tijdgerelateerd onderzoek m.b.t. strategische veranderingen. Dit behelst de roep om het multidimensionale en complexe karakter van polyfonieⁱ te verduidelijken in organisaties, alsook om een meer holistisch perspectief – via de Integrale Entrainment Matrix – te nemen van de verschillende tijdgebonden elementen bij strategische veranderingen. Bovendien benadrukt het literatuuronderzoek in dit proefschrift andere vormen van entrainment, zoals kennis-, emotioneel- en gedragsentrainment, die kunnen worden gebruikt in toekomstig onderzoek naar strategische verandering.

Ten slotte beantwoordt dit proefschrift ook aan een aantal geherprioriteerde managementuitdagingen als gevolg van de covid-19 pandemie, opgemerkt door het Barrett Values Centre, maar ook aan uitdagingen die eerder zijn geïdentificeerd in strategische verandering. Ten eerste kan het herziene model van spiritueel leiderschap worden toegepast om de verschuiving in prioriteit van vier kernwaarden (welzijn, verschil maken, aanpassingsvermogen en zorgzaamheid) op individueel niveau te ondersteunen, maar ook het aanpassingsvermogen, de gedeelde visie en het welzijn van organisaties. Tevens benadrukt het proefschrift het belang van persoonlijk spiritueel leiderschap bij spiritueel leiderschap in groepen. Ten tweede bieden de hierin gepresenteerde studies een bredere wetenschappelijke basis voor het ontwikkelen en verbeteren van innovatieve tools om managers te helpen om de timing van ritmische evenementen af te stemmen op andere organisatorische evenementen en processen. Ten derde benadrukken ze ook dat verheven emoties - zoals dankbaarheid, zorgzaamheid, niet-oordelen en vergeving - de acties van veranderingsleiders positief kunnen beïnvloeden, die vervolgens de emoties en acties van

ⁱ het bestaan van meerdere reeksen activiteitscycli die onderling afhankelijk zijn

anderen kunnen meesleuren via organisatorisch als emotioneel entrainment. Ten vierde kan de voorgestelde Integrale Entrainment Matrix helpen bij het in kaart brengen van de samenhang van de strategische veranderingsprocessen en hoe veranderingsagenten gebruik kunnen maken van de vooropgestelde tijdgebonden elementen bij het leiden van de verandering. Naast deze praktische bijdragen in het kader van verschuivende organisatiewaarden en strategische verandering, benadrukt dit proefschrift het belang van het bieden van een organisatorische context voor een innerlijke bewustzijnsbeoefening. Tot slot nodigt dit proefschrift leidinggevenden uit om (meer) aandacht te besteden aan de coherentie tussen de visie, de organisatorische waarden en de acties in hun organisaties.

1.1 Background and relevance

How to foster entrainment in organizations? This is the background question that guides this dissertation. The word *entrainment* originates from the French verb “*entraîner*” (to drag, to pull) and was first noted by the Dutch mathematician, Christiaan Huygens in the 17th century (Willms et al. 2017; Minorsky 1962). It has already been studied in a variety of disciplines – such as physics (e.g., List & Sci 1973; Sreenivas & Prasad 2000), neurosciences (e.g., da Silva 1991), physiology (e.g., Goldberger 2002), biology (e.g., Aschoff 1979; Néda et al. 2000) – before researchers in organizational behavior (e.g., Ancona & Chong 1996; Perez-Nordtvedt et al. 2008) used this phenomenon to emphasize the importance of time, pace, rhythm, and business cycles in organizations. Entrainment is defined as the “adjustment of the pace or cycle of activity to that of another” (Ancona & Chong 1996: 253) and is positively related to organizational outcomes (e.g., Khavul et al. 2010; Shi & Prescott 2012; Dibrell et al. 2015). The basic idea on which entrainment in organization theory is built, is that naturally occurring cycles exist within individuals, groups, organizations, and environments (Ancona & Chong 1996). Pérez-Nordtvedt et al. (2008: 785) note that organizational scholars have often borrowed concepts initially developed in other fields to enrich “the study of organizations by enabling a more sophisticated understanding of various phenomena explaining organizational dynamics”. Furthermore, they contend that the concept of entrainment “holds the potential for organizational scholars to continue this borrowing process and enrich the field of organization science” (785). For example, the natural laws from biology were used as metaphors to explain various social phenomena and business trends (Modis 1998). Another example are the population ecology models of biological species that helped the understanding of analogous phenomena in organizations (e.g., Hannan & Freeman 1977). Pérez-Nordtvedt et al. (2008: 796) conclude that “entrainment contributes a temporal aspect to multiple organizational theories including

institutional theory, population ecology, and contingency theory” consistent with “the McKinley et al. (1999) call for theories that integrate older, established research with new and innovative perspectives.”

Still to date, entrainment in organizations has been discussed mainly to its external environment, although the organization’s internal activities should be entrained as well (i.e., intraentrainment) to enhance organizational outcomes (e.g., Perez-Nordtvedt et al. 2008; Shi & Prescott 2012). In addition, Ancona and colleagues argued that such an entrainment lens can explain organizational phenomena which are not sufficiently explained by current theories (Ancona et al. 2001; Ancona & Chong 1996). It not only provides a framework to explain and understand organizational behavior, but it emphasizes the existence of rather new dependent and independent temporal variables, such as, pacing, duration, intensity, stage, and implementation speed. Ancona et al. (2001) contended that taking into account these new variables in research would advance the quality of empirical research in this field. Moreover, Kunisch et al. (2017) note that multiple sets of these temporal variables are in existence at once in organizations. They are interdependent and entrained to one another, and account for the complex nature of strategic change, making it important to find the right balance for successful accomplishment.

1.2 Objectives and research questions

Against the background question of how to foster entrainment in organizations, the following research questions are asked in this dissertation:

- What is understood by entrainment in organizations?
- What vocabulary do organizational scholars and practitioners need to discuss about entrainment in organizations?
- What are the fields of research where the concept of entrainment has contributed to better understand organizations?
- How can organizational entrainment be positively influenced or optimized?
- How to drive intraentrainment in organizations for improved organizational outcomes and well-being?

Keeping these questions in mind, the objective of this dissertation is: to extend the current theory of organizational entrainment by (a) clarifying intraentrainment through the addition of another variable and more integral view to the theory; by (b) proposing a leadership construct to drive such intraentrainment in organizations; and by (c) testing this construct in practice using a comparative research design.

These objectives address two major gaps in the extant literature on entrainment in organizations. First, exploration of organizational intraentrainment has been limited although it is essential for improved organizational outcomes (Hopp & Greene 2018, Perez-Nordtvedt et al. 2008). From the field of physiology, Pittendrigh (1972) argues that such intraentrainment is the central problem for understanding how all these rhythms are organized in the human system. McGrath et al. (1984) also point out that humans show quite strong patterns of intraentrainment in comparison to many animals who are strongly entrained to an external pacer (e.g., dark/light cycles). Second, the use of leadership constructs to foster organizational entrainment has been scarce despite that the perception of the rhythms and pacers in this process of entrainment are crucial (Riolfi-Saltzman & Luthans 2001; Pérez-Nordtvedt et al. 2014; Labianca et al. 2005), as well as the skills to manage rhythmic strategic choices over time (Pérez-Nordtvedt et al. 2008; Shi & Presott 2012; Bonneau 2007; Huy 2001), or the ability to take part in this entrainment process (Lervik et al. 2010; De Nito et al. 2013). In addition, Ofori-Dankwa & Julian (2001) question to what extent managers can be trained in entrainment management, while Ancona and Tushman highlight the temporal leadershipⁱ challenges that senior teams encounter as they assist their organizations in adapting to the changing environments (Ancona et al. 2001). To the best of my knowledge, only the empirical research of Mohammed & Nadkarni (2011: 502) expanded this nascent notion of temporal leadership to the team, highlighting “the importance of temporal leadership behaviors in effectively managing teams”. Shamir (2011: 307), on the other hand, calls “for more attention to time-related considerations in theory development and empirical studies of leadership.”

ⁱ “Teams enact temporal leadership as they entrain their organizations to technology and competitive cycles, manage across multiple time frames, and create temporal architectures for their organizations.” (Ancona & Tushman, in Ancona et al. 2001: 655)

1.3 Empirical data and epistemological assumptions

Empirical data consists of quantitative data coming from surveys (97 participants) and from physiological measures (4 500 data points), conducted at a professional services company and at an accredited healthcare academy. The qualitative data includes a total of seven recorded and fully transcribed face-to-face interviews from the same professional services company.

To advance the theoretical and practical understanding of organizational entrainment, with a focus on intraentrainment, this dissertation takes an overall pragmatist research approach. Pragmatism as research paradigm is based on the proposition that the researcher should use the philosophical and/or methodological approach that fits best the research problem being investigated; placing the research question above philosophical considerations (Tashakkori & Teddlie 1998; Feilzer 2010). This typically entails that both quantitative and qualitative data are mixed using multiple methods (Creswell 2014). The term “paradigm” refers to a set of philosophical assumptions or beliefs that define the worldview and actions of the researcher (Lincoln et al. 2011). According to Kaushik & Walsh (2019: 3), pragmatists believe that reality changes continuously and that “human actions can never be separated from the past experiences and from the beliefs that have originated from those experiences”. This implies that human thoughts are naturally linked to action. Actions are central in pragmatism (Goldkuhl 2012; Maxcy 2003; Morgan 2014). Pragmatism as research paradigm accepts that there can be many realities that are open for empirical investigation (Creswell & Clark 2011). Biesta (2010) sees pragmatism as a set of valuable philosophical tools for addressing problems instead of a philosophical position. The basis of pragmatist epistemology (i.e., assumptions about how we gain knowledge) is that knowledge is unique for each person and it is created through her/his unique experiences, while much of this knowledge is shared through socially shared experiences, hence, all knowledge is social knowledge (Morgan 2014). Farjoun et al. (2015) note that pragmatists “tend to view the social world in terms of processes that connect all sorts of entities in relational and recursive ways” and identified three components of the pragmatist ontology. First, pragmatists focus on process where they regard process and structure as an interrelated pair (Elkjaer & Simpson 2011). Next, they adopt a relational view emphasizing that the characteristics of individuals are the result of relations with others, being a dynamic, unfolding, ongoing process (Emirbayer 1997). The third

component is recursiveness, stressing that these processes are cyclical, iterative and cumulative.

There are several reasons why pragmatism is used as an overall research paradigm for this dissertation. First, I - as a researcher - believe that there exist multiple realities and that each person experiences her/his own reality through her/his own unique experiences. Second, I also believe that there exists a shared social knowledge we collectively create and to which we can connect. Next, according to Kaushik & Walsh (2019: 5) and based on Dewey's framework, "we, as living organisms, are capable of establishing and maintaining a dynamic coordination with our environment". Through such a dynamic coordination, a learning process is established that will shape our actions to become more congruent with our continuously changing environment, which is a key concept of both pragmatism and entrainment. Finally, the choices I have made as a researcher in this dissertation were influenced by my previous experiences, my belief system and socio-political location in light of the objectives of this dissertation.

1.4 Theoretical and practical relevance

In terms of theoretical relevance, this dissertation makes four contributions. First, it explores intraentrainment and introduces the variable *coherence* to the theory of entrainment. Coherence describes the degree of entrainment, highlighting the importance of both internal and external entrainment, currently under-investigated in organizational entrainment theory. Second, the application of the refined entrainment lens to the model of spiritual leadership created a different understanding and working of that model. The third theoretical contribution is the proposition to drive intraentrainment in organizations through the application of that spiritual leadership model, addressing the gap mentioned above. Finally, the empirical study at the professional services company provides further support to the theory of spiritual leadership that inner life has a positive influence on all spiritual leadership variables.

Although not qualified as theoretical contributions according to Whetten (1989), this dissertation contributes to several theoretical debates. It advances our understanding of the time-related concept of entrainment in organizational research. As such, it contributes to the general theoretical debates to bring more awareness to integrate time-related

dimensions in future organizational and process studies. In addition, the literature review in this dissertation not only helps to prevent reinventing the wheel (Zorn & Campbell 2006), but “allows researchers to enhance the body of knowledge by a process of accumulation” and “can also (re)vitalize research by enabling the revolutionary nature of scientific progress” (Schryen, Wagner & Benlian 2015: 2). This dissertation also makes specific contributions to the theoretical debate and calls for more time-related research in strategic change, put forward by Kunisch et al. (2017). Organizational entrainment contributes to the call for the appreciation of polyphonyⁱ to clarify its multidimensional and complex nature. The Integral Entrainment Matrix, proposed in this dissertation, contributes to the call for taking a more holistic perspective of the several temporal markers experienced by the organizational actors involved in strategic change. Moreover, the literature review in this dissertation highlights other forms of entrainment that can be used in future research of strategic change. Knowledge entrainment, for instance, can help to understand how change agents integrate knowledge and increase the speed of learning in organizations, while emotional and behavior entrainment can contribute to better explain the role of emotions in strategic change.

In terms of practical relevance, this dissertation responds to a number of recent reprioritized managerial challenges due to the covid-19 pandemic, noted by the Barrett Values Centre (Wiedemann 2020), but also to challenges identified in strategic change by Kunisch and colleagues (2017). First, it provides a revised model of spiritual leadership that can be applied to support the shift in importance of four values at the individual level (i.e., well-being, making a difference, adaptability, and caring), but also the values of adaptability/agility, shared vision, and well-being at the organizational level. In addition, the dissertation advances the importance of personal spiritual leadership for spiritual leadership in groups. Second, the studies presented herein offer a more comprehensive scientific foundation for generating and enhancing innovative tools to help managers aligning the timing of rhythmic events to other organizational events and processes. Third, they also highlight that elevated emotions – such as appreciation, care, nonjudgment, and forgiveness – may positively influence change leaders’ actions impacting the emotions and actions of change recipients through both organizational and emotional entrainment. Fourth, the proposed Integral Entrainment Matrix may help to identify how strategic

ⁱ In an organizational context, polyphony refers to existence of multiple sets of activity cycles that are interdependent and entrained to each other for successful accomplishment (Kunisch et al. 2017).

change processes are interrelated and how change agents can make use of the temporal markers in leading the change. Besides contributions to shifting organizational values and to strategic change, the importance of providing an organizational context that fosters inner life practices for individuals (e.g., meditation, prayer, journaling, spending time in nature) has been highlighted several times in this dissertation. It not only enhances personal and organizational well-being, it positively influences organizational outcomes too. Finally, another contribution for management practice is the invitation to spend (more) managerial attention to find out how coherent the shared vision, organizational values and actions (cf. spiritual leadership variables) are aligned in practice.

1.5 Structure of this dissertation

This dissertation is structured as follows (Table 1.1). Using a systematic literature review methodology, chapter 2 examines the concept of entrainment in organizations within the extant literature to verify if there is a common understanding as to what constitutes entrainment in organizations (i.e., definition, types, assumptions) and to highlight the current status of research in this field (i.e., levels of analysis, research methodologies). To clarify this phenomenon further and to give the reader a broader context, a thematic review is added. As such, the objective of this chapter is to ground the studies described in the following chapters and to provide the reader the context in which these are conducted.

The research in chapter 3 explores intraentrainment at the individual level informed by physiological entrainment in the human being. It starts with introducing an overall framework of entrainment, i.e., the *Integral Entrainment Matrix*, to position intraentrainment more clearly against other types of entrainment. Then, physiological entrainment is discussed at the individual level, with a focus on intraentrainment or the functioning of the human heart, in order to argue that an additional variable, *coherence*, can add value to the current theory of organizational entrainment to denote the quality of interaction.

Table 1.1 Dissertation overview.

Chapter	Research questions	Data & Methods	Findings & Contributions
2. Entrainment in organizations: a literature review	<ul style="list-style-type: none"> • What is understood by entrainment in organizations? • What vocabulary do organizational scholars and practitioners need to discuss about entrainment in organizations? • What are the fields where the concept of entrainment has contributed to better understand organizations? 	<ul style="list-style-type: none"> • Literature review • Thematic analysis 	<ul style="list-style-type: none"> • Common understanding exists but is complex • Six themes identified • Two major gaps identified
3. Refining the entrainment lens with learnings from physiological entrainment	<ul style="list-style-type: none"> • What can we learn from physiological entrainment in the human body to inform organizational intraentrainment? • How can organizational entrainment be enhanced? 	<ul style="list-style-type: none"> • Conceptual 	<ul style="list-style-type: none"> • Integral Entrainment Matrix • Coherence as additional variable to the theory of organizational entrainment
4. Driving organizational intraentrainment through spiritual leadership	<ul style="list-style-type: none"> • Which leadership construct can drive intraentrainment in organizations? 	<ul style="list-style-type: none"> • Conceptual 	<ul style="list-style-type: none"> • Spiritual leadership as construct to drive intraentrainment
5. Evaluating the conditions for entrainment through spiritual leadership	<ul style="list-style-type: none"> • Does inner life moderate the coherent interaction among the spiritual leadership variables? • Can heart coherence be considered as an indicator of spiritual leadership? 	<ul style="list-style-type: none"> • Quantitative, within-subjects, pre-test and post-test longitudinal design • 11 participants; 2 groups • 4'500 physiological datapoints (heart) • Statistical analysis (JMP) • Qualitative comparative analysis approach (R Studio) 	<ul style="list-style-type: none"> • Inner Life x Coherent Interaction -> Spiritual Well-Being can be usefully deployed at personal and team level
6. Evaluating intraentrainment at a professional services company	<ul style="list-style-type: none"> • Does inner life moderate the coherent interaction among the spiritual leadership variables? • Does entrainment mediate the relationship between spiritual leadership and spiritual well-being? • How do teams and team leaders differ on these variables in a professional service company? 	<ul style="list-style-type: none"> • Mixed-methods sequential explanatory research design • 86 participants; 14 teams • Statistical analysis (R Studio) • Qualitative comparative analysis approach (R Studio) • 7 semi-structured interviews • Coding and (cross-)thematic analysis (NVivo) 	<ul style="list-style-type: none"> • Inner Life x Coherent Interaction -> Spiritual Well-Being can be usefully deployed at personal and team level • Inner Life positively influences spiritual leadership variables • Positive correlation between personal and team spiritual leadership

Note: Chapters 3, 4, 5 and 6 are based on articles published in peer-reviewed journals or presented at scientific conferences. See Appendix for a complete list of publications.

Chapter 4 argues that the model of spiritual leadership is a leadership construct that is capable of driving such intra-entrainment in organizations. This study introduces a conceptual refinement of this model inspired by the entrainment principles to highlight an alternative relationship among the variables. It then discusses that entrainment mediates the relationship between spiritual leadership and its outcome, spiritual well-being. This study also argues that personal spiritual leadership is positively influenced by an effective inner life, and is a prerequisite for interpersonal entrainment. Moreover, it posits that higher levels of personal spiritual leadership are reflected through a coherent heart rate variability. As such, this study proposes a basis for new empirical research in the fields of spiritual leadership and entrainment.

Building further on the previous chapter, the empirical research in chapter 5 evaluates the conditions for entrainment at the individual and group level, through which spiritual well-being emerges, by addressing the coherent interaction among spiritual leadership variables and inner life measures. It employs a multilevel, quantitative, within-subjects, pre-test, and post-test longitudinal design. It uses a fuzzy set qualitative comparative analysis approach and heart coherence analysis to verify the hypotheses presented in the previous chapter. The study provides support that inner life and coherent interaction can be usefully deployed to understand the emergence of spiritual well-being through entrainment.

The empirical study in chapter 6 evaluates the conditions for entrainment through the adapted model of spiritual leadership – put forward in chapter 4 and tested in the previous chapter – using a mixed methods design and a qualitative comparative analysis approach. Whereas chapter 5 compares the emergence of spiritual well-being through entrainment within an academic environment, this study evaluates these same conditions at a professional services company, also at the individual and group level, using an explanatory sequential research design as mixed methods approach, integrating quantitative data from eighty-six participants across fourteen teams with qualitative data from five team leaders.

Chapter 7 concludes this dissertation with a discussion of the major conclusions framed in the literature of organizational entrainment. It highlights its contributions and the implications for this field, in theory and practice, but also how this dissertation helps to address today's reprioritized managerial challenges due to the covid-19 pandemic, and,

more specifically, some challenges in strategic change. The studies in this dissertation were conducted within specific boundaries. Entrainment has only been researched with a focus on intraentrainment at the individual and group level. Hence, it did not take into account its influence on and from other types of entrainment, nor from other levels. Entrainment has also been studied in the context of a training and a professional services company with the objective to test a leadership construct in driving entrainment. As such, the objective was not to contribute explicitly to that literature, but to the literature of entrainment in organizations.

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Entrainment in organizations: a literature review

This chapter is based on an earlier version presented at the Doctoral Day of the Faculty of Business & Economics, University of Antwerp, 2018.

Time plays an important role in people's lives as well as in organizations, but the relative lack of attention to time and time-related issues in organizational research is both "paradoxical and confusing" (Roe, Clegg & Waller 2009: 1). Although entrainment describes a process of synchronizing rhythms over time (Bluedorn 2002), this construct has not received much attention from the process research studies presented by Langley and colleagues (2013). Klarner & Raisch (2013) even considered the study of these rhythms in relation to firm performance as a gap in process research. In addition, the critical review of time in strategic research of Kunisch et al. (2017: 1005) revealed a need to "advance scholarly understanding about the processual dynamics of strategic change" (1005) and highlighted that time is "common and foundational to all strategic change research". Despite these calls and the empirical evidence that organizations benefit from entrainment (e.g., Khavul et al. 2010; Shi & Prescott 2012; Dibrell et al. 2015), the number of publications in this field to date is still limited. This systematic literature examination of entrainment in organizations aims to contribute to these debates by answering the following research questions: What is understood by entrainment in organizations? What vocabulary do organizational scholars and practitioners need to discuss about entrainment in organizations? To which fields did the concept of entrainment contribute to better understand organizations? After a rigorous search, selection, and elimination, 41 articles are reviewed to answer those questions.

2.1 Introduction

According to Dawson (2014: 285), “Time is the ultimate paradox, an intriguing unresolvable puzzle that has engaged the minds of scientists (Isaacson 2008), philosophers (McTaggart 1993), poets (Eliot 2002), geographers (Thrift 2004) and sociologists (Elias 1993)”. Meanwhile, research on time in organizations has introduced a broad range of concepts (Dawson 2014). Jaques (1982) has remarked that there are two major philosophical views of time: time as *chronos*, or clock time, and time as *kairos*, or social time. *Chronos* is viewed as objective, absolute, real, discontinuous, and atomistic, while *kairos* is subjective, continuous, shaped and distorted by events, socially constructed (Cunha 2009; Jaques 1982). Bluedorn (2002), on the other hand, suggests to think of time in degrees of difference between fungible times (time units that are substitutable, like clock time) and epochal times (defined by events). Cunha (2009) makes a distinction between the organizing of rhythms, emphasizing the absolute dimension of time, *chronos*, and the rhythms of organizing, the subjective dimension of time, *kairos*. The first refers to the pace determined by the organization, while the latter refers to the internalized rhythms of organizing, nurtured by an organization’s culture (Schein 1985). The word ‘rhythm’ is defined as the “succession at regular intervals of a given movement or process” (Cunha 2009: 223). The related concept of temporality describes the way periods of time (past, present, future) are related to each other; “temporality (tensed time) captures the sense of temporal flow and movement in which our experiences are not isolated ‘now’ moments (tenseless time) but engage with and are informed by memories of the past and anticipations of a future yet-to-come.” (Dawson 2014: 286).

Ancona et al. (2001) argue that there is a lack of coherence in the research on time in organizations, and, therefore, developed a temporal framework based on widely cited research articles in this area. Their research identified three broad categories of the temporal variables; a variable being defined as “a construct that could take on a range of different values, through which particular phenomena could be described” (Ancona et al. 2001: 513). As shown in Figure 2.1, these three categories are:

- (1) *Conceptions of time*. Ancona et al. (2001) distinguished different types of time and socially constructed time. The first subcategory ‘time’ includes variables such as linear or clock time, cyclical time, subjective and event

time. Variables of 'socially constructed time' include work schedules, celebrations, time as linear continuity.

(2) *Mapping activities to time*. This category deals with the way activities are mapped to time: single activity mapping (e.g. scheduling, duration), repeated activity mapping (e.g. cycle, rhythm, frequency), single activity transformation mapping (e.g. life cycle, deadline behavior, interrupts, jolts), multiple activity mapping (e.g., allocation of time, ordering, relocation, synchronization), but also comparison and meshing of activity maps. Entrainment is a temporal variable identified in this latter subcategory, besides patterning and temporal symmetry.

(3) *Actors relating to time*. This category concerns variables of temporal perception (i.e., how time is perceived through the senses) and temporal personality (i.e., the way of interaction with time).

With their temporal framework, Ancona et al. (2001: 527) highlight "the interdependence that exists across the categories of variables, with many interconnections among them". Ballard (2009: 204) takes this a step further arguing that activity cycles are the sources of entrainment. She notes that "researchers often fail to consider the cyclical processes that shape and are shaped by members' experience of time, as well as the overlapping activity cycles within which members engage at any single time". However, Ballard (2009: 204) contends that the entrainment perspective is an exception because it recognizes that "cycles are definitional to time and the temporal processes experienced by living systems" and proposes activity cycles as the unit of analysis because they already incorporate the interpretation of temporal structures (Giddens 1984). Furthermore, Ballard (2009) highlights that activity cycles as sources of entrainment is consistent with Mohr's (1998) view that we must understand the practical demands in which it operates to understand the nature of any cultural system.

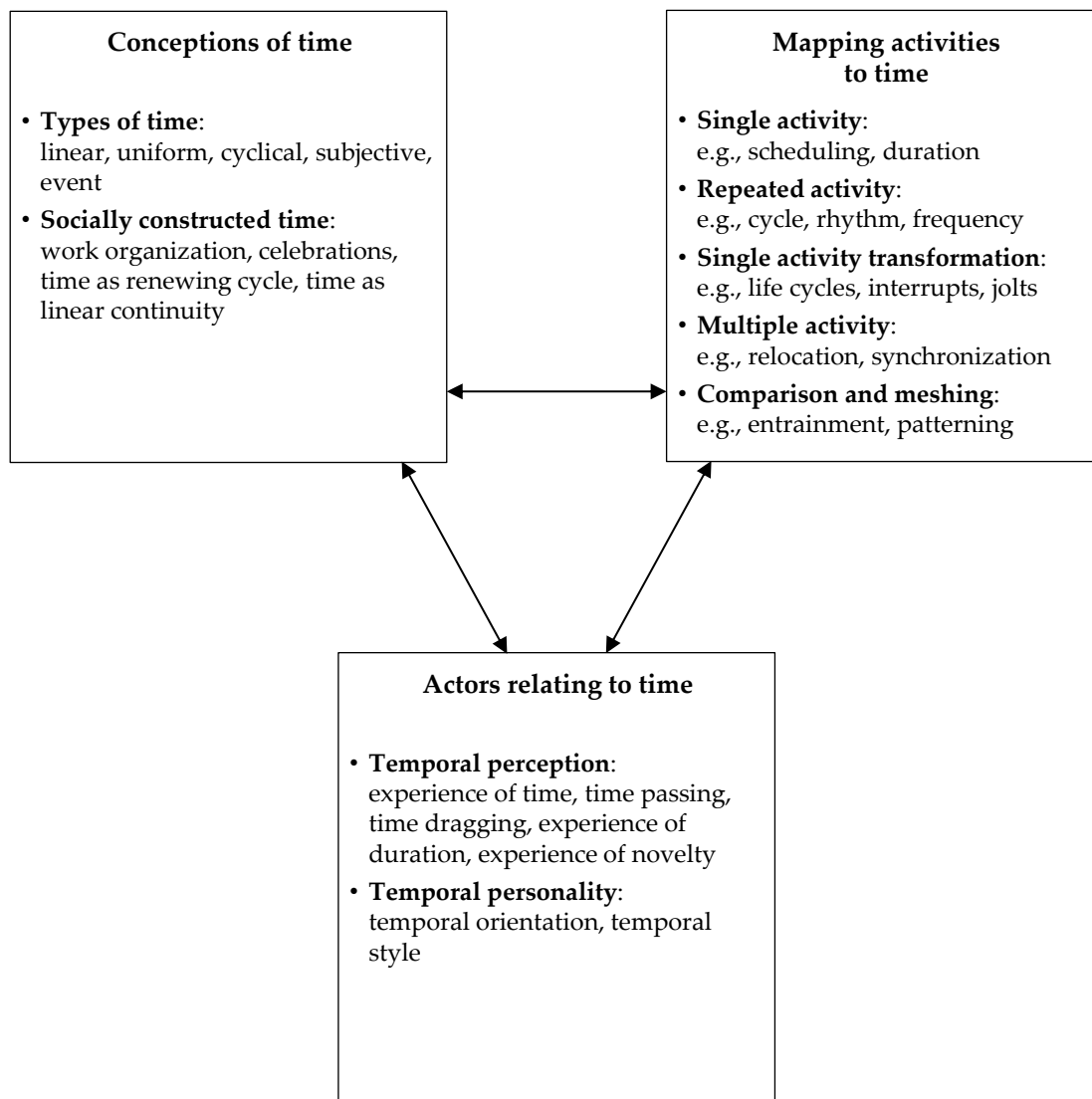


Figure 2.1 Temporal framework (adapted from Ancona et al. 2001).

Also, in process studies, time and temporality play a central role (Langley et al. 2013). These studies can be viewed from two major ontologies: a substance ontology, where the world is made of things in which processes represent change in things; and a process ontology, where the world is viewed as made up of processes rather than things (Langley et al. 2013). According to Nayak & Chia (2011: 288), such a process philosophical approach “gives primacy to an ontology of becoming (Bergson 1911, 1998; Whitehead 1929) in which processes, relations and interactions are construed as primary attributes of reality.” Although entrainment describes a process of synchronizing rhythms over time (Bluedorn 2002), this construct has not received much attention from the process research studies presented by Langley and colleagues (2013). However, Klarner & Raisch (2013) did study

change rhythms and frequency in relation to firm performance, considered as a gap in process research.

More recently, Kunisch et al. (2017: 1005) critically reviewed the roles of time in strategic change highlighting that time is “common and foundational to all strategic change research”, manifested in various strategic change phenomena, theories and methods. Their review revealed a need to anchor strategic change in the time literature, as well as to “advance scholarly understanding about the processual dynamics of strategic change” (1005). Additionally, they put forward a number of pathways for future research. One pathway includes the appreciation of polyphony to account for the multidimensional and complex nature of strategic change. From an organizational perspective, “polyphony refers to the fact that there are often multiple sets of sequencing, timing, pacing, and rhythm in existence at once, and these are interdependent and entrained to each other (Ancona & Chong 1996; Bluedorn 2002). That is, two or more sets of activity cycles (Ballard 2009) depend on each other to be accomplished successfully.” (Bartunek & Woodman 2015: 170–171, quoted in Kunisch et al. 2017: 1048). This entails finding the right balance between multiple temporal markers of strategic change (e.g., phase, timing, pace, duration, sequence, frequency, rhythm). Moreover, Kunisch and colleagues (2017: 1048) argue that “taking this more holistic perspective would be very helpful in understanding the temporal dynamics of strategic change more deeply”. Another pathway concerns the capacity of change leaders to recognize and address the temporal variations in shared emotions that organizational members experience during strategic change (Sanchez-Burks & Huy 2009). This plays a considerable role because strategic change processes are inherently fraught with emotion, both at an individual and organizational level (Vuori & Huy 2016), directing people’s attention to those events that trigger these emotions. Therefore, it is important to value the role of emotions herein to fully understand the temporal character of strategic change (Kunisch et al. 2017). How the various time-based tools and practices influence “the quality and speed of learning of change agents and enable them to accumulate novel and useful knowledge” is another pathway identified by Kunisch et al. (2017: 1047).

Besides the temporal lens in organizational research, and more precisely in process studies and strategic change, specific research on entrainment has also shown it to be a substantive process in organizations with a positive impact on organizational outcomes (e.g., Hopp & Greene 2018; Dibrell et al. 2015; Perez-Nordtvedt et al. 2014; Shi & Prescott 2012). In addition, entrainment has the potential to be able to explain organizational phenomena that

contemporary theories could not sufficiently explain (Ancona et al. 2001; Ancona & Chong 1996). For example, why a migration towards a new information technology system worked in one organization but did not work in another, could benefit from a study using the entrainment lens: when was such a system introduced and how fast; had the organizational members enough time to learn the new technology; what was the planning horizon of this migration for management; was the system new or had it a proven track record of success and competitive edge. Hence, this lens provides not only a framework to explain and understand organizational behavior, but it emphasizes the existence of rather new dependent and independent variables, such as, pacing, duration, intensity, stage, and implementation speed. Ancona et al. (2001) argued that taking into account these new variables in our research would advance the quality of empirical research in our field.

However, the relationship seems not that simple. One's perception of those rhythms and paces in this process is crucial (Riolfi-Saltzman & Luthans 2001; Pérez-Nordtvedt et al. 2014; Labianca et al. 2005), as well as a one's behaviors (Waller 1999; Mohammed & Nadkarni 2011) and skills to manage rhythmic strategic choices over time (Pérez-Nordtvedt et al. 2008; Shi & Prescott 2012). Kelly & Barsade (2001) note that the interaction intensity plays a role too, while Luciano et al. (2018) warn for a complacency effect with frequently performed tasks. Do we really understand this phenomenon in the context of organizations?

Against the background question of how to foster entrainment in organizations, the ambition of this study is to provide a systematic examination of entrainment in organizations focusing on published peer-reviewed journal articles to answer the following research questions:

- What is understood by entrainment in organizations (i.e., definition, types, assumptions)?
- What vocabulary do organizational scholars and practitioners need to discuss about entrainment in organizations?
- What are the fields where the concept of entrainment has contributed to better understand organizations?

It proceeds as follow. First, the systematic literature review methodology and its results are presented. Next, the research methodologies used in the included articles are reviewed,

and the major definitions of entrainment are examined together with the components, assumptions, and types. Then, the levels of analysis of the articles in the review are discussed, followed by a review of the main themes to which entrainment has contributed. To conclude, some major research gaps and future directions are considered.

2.2 Literature review methodology and results

2.2.1 Methods

The scope of this literature review includes peer-reviewed knowledge from academic journals and conference proceedings. Hence, it excludes book chapters and non-academic articles.

To cover a broad range of articles in the management and business field, five electronic databases are chosen based on academic rigor and quality these fields. These databases include EBSCOhost, Emerald Insight, JSTOR, ScienceDirect, and Web of Science (see Appendix of this study for a short description). The relevant literature is identified and reviewed in the period August-September 2018 using the search "organization AND entrainment" in at least the title, abstract or keywords (see details in Table 2.1), without setting any timespan (i.e., covering all years in the database).

The search produced 177 items and encoded by one of the researchers based on the article's title, authors, publication date, journal, and database. 13 duplicates were eliminated to obtain an initial set of 164 articles for further review. Two researchers working on this study read the abstracts autonomously to verify the relevance to the research scope, i.e., does the article contribute to answer the research questions stated above. To ensure consistency and validity of the literature screening (Neuendorf 2002), the inter-coder reliability was verified using ReCal (Freelon 2010a, 2010b). The outcome was a Scott's Pi and Cohen's Kappa of 0.85, which assumes an acceptable reliability level (i.e., > 0.80).

Table 2.1 Database search protocol.

Database	Search criteria Content type Subject/categories Search fields	Search date	Result (# items)
EBSCO Business Source Complete	organization AND entrainment articles; proceedings; working papers - all search fields	15/8/2018	27
Emerald Insight	organization AND entrainment research and conceptual papers all all search fields	15/08/2018	36
JSTOR	organization AND entrainment articles business; economics; management & OB all search fields	15/08/2018	91
ScienceDirect	organization AND entrainment research articles business title, abstract and keywords	15/08/2018	8
Web of Science Core Collection	organization AND entrainment articles; proceedings business; management title, abstract and keywords	15/08/2018	15
		Total:	177
		Duplicates:	13

Articles without agreement between these two researchers were discussed in more detail until a joint agreement was reached. Because of the broad search, 112 articles were excluded for non-compliance with the review criteria (academic, peer-reviewed, relevant to the research questions). These articles did not contribute to a better understanding of entrainment in organizations. This resulted in 52 articles for further screening. Next, the full text of these articles was assessed by the same researchers for final inclusion in the review, based on the same criteria. Another eleven articles were excluded, resulting in 41 articles. The process of this review is shown in Figure 2.2.

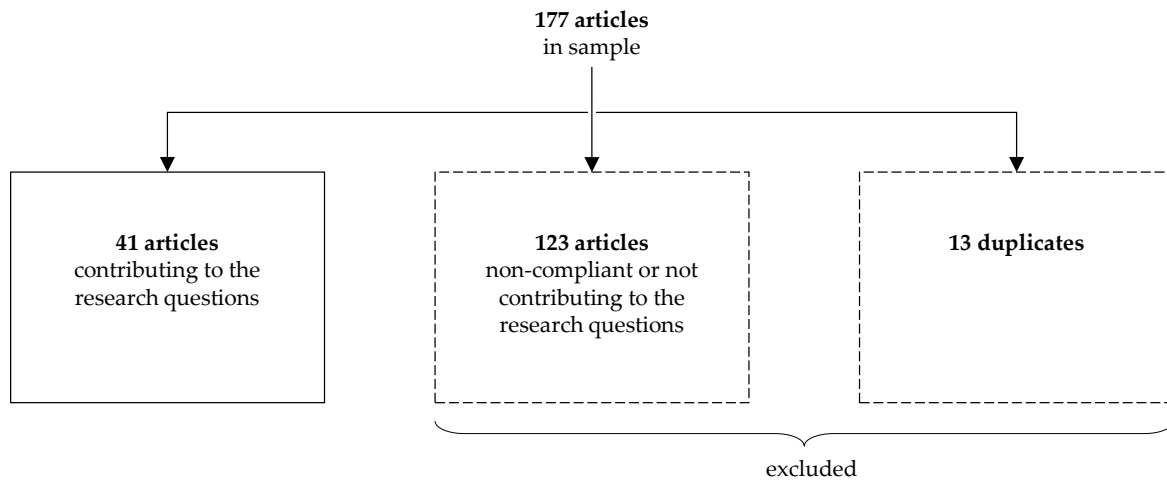


Figure 2.2 Literature review process.

2.2.2 Results

The articles included in this review were published between 1992 and 2018, about 1.5 articles on average per year, as shown in Figure 2.3. In 2001, a maximum number of six articles has been published, of which five by the Academy of Management, as the result of their Annual Conference theme of 2000: "A New Time." This theme was chosen "to take advantage of the year of the meeting and to stimulate and encourage new and creative thinking and research on time, an area of inquiry that plays important roles in both management research and practice, but that has not received as much scholarly attention as it warrants." (AoM 2000)

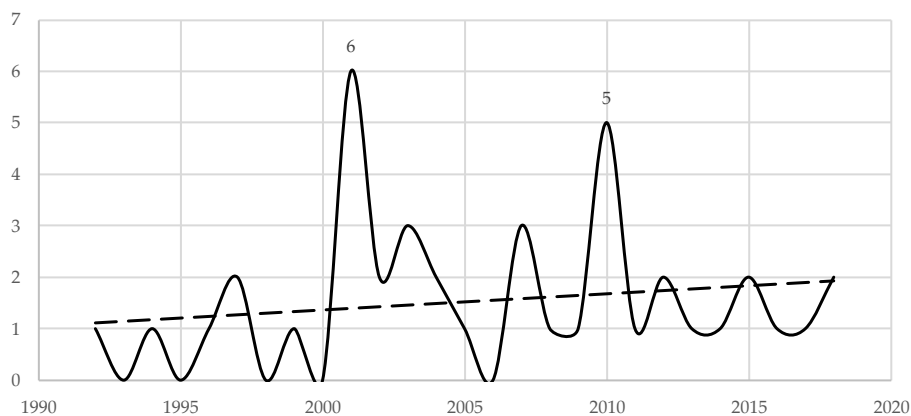


Figure 2.3 Number of included articles by publication year.

Moreover, the publications of the Academy of Management (including *AoM Journal*, *AoM Review*, *AoM Executive*, and *AoM Best Paper Proceedings*) represent about one-third of the articles included in this review. Table 2.2 gives an overview of the major journals.

Table 2.2 Major journal titles of included articles.

Journal	# Articles*	% Articles*
Academy of Management <i>publications</i> (4)	14	34%
Organization Science	3	7%
Journal of Management Studies	2	5%
Organization Studies	2	5%
<i>Other</i> (20)	20	49%
	41	100%

* Number/percentage of articles published in the journal that are included in this review

Looking at the 93 authors in this review, eight persons authored almost 50% of the selected articles, as shown in Table 2.3. Especially Ancona set the scene having published her articles (included in this review) between 1992 and 2001, and then Pérez-Nordtvedt, building further on it.

Table 2.3 Top authors of included articles.

Author	# Articles	# 1st Author
Ancona, Deborah G.	3	3
Pérez-Nordtvedt, Liliana	3	2
Dibrell, Clay	2	1
Harrison, David A.	2	1
Khavul, Susanna	2	1
Mohammed, Susan	2	1
Perlow, Leslie A.	2	1
Söderlund, Jonas	2	1
	18	11

2.2.3 Review of research methodologies

This methodological review also gives an overview of the used research methodologies in the selected articles for this review. It is based on excerpts describing the applied methods.

Discussion among the researchers doing the selection led to four categories of research methodologies: (a) non-empirical research, mainly conceptual papers; (b) qualitative research, mainly interviews and case studies; (c) quantitative research, mainly surveys; (d) mixed methods, combining both qualitative and quantitative approaches. Table 2.4 and Figure 2.4 give an overview.

Table 2.4 Research methodologies used.

	# Articles	% Articles
Non-empirical	19	46%
Qualitative	5	12%
Quantitative	5	12%
Mixed	12	29%
	47	100%

Non-empirical research methods were used in 46% of the reviewed articles ($n = 19$), followed by mixed approaches in 29% of the articles ($n = 12$). Quantitative and qualitative methods were each 12% ($n = 5$). This result can be explained by the variety of research questions, applications, and levels of analysis, but could also indicate the novelty (or complexity) of the topic and the need for further exploration.

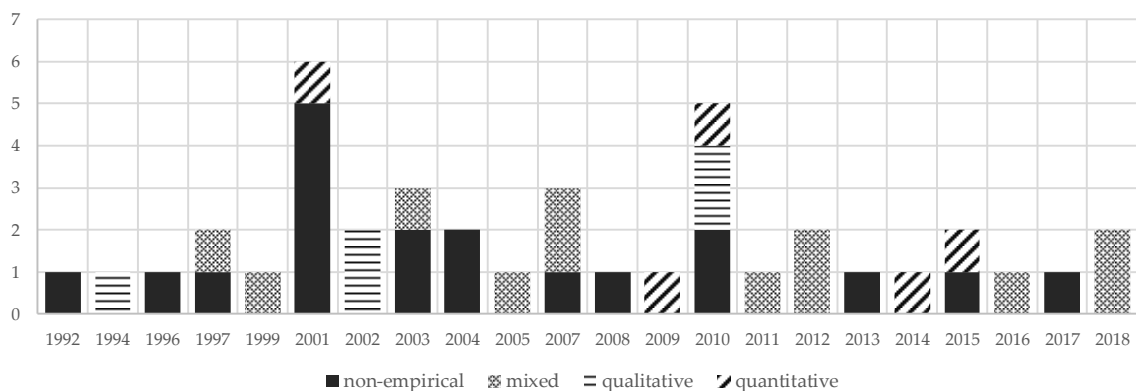


Figure 2.4 Distribution research methodologies used in reviewed articles.

2.3 Review of definitions

To get a better understanding of the concept of entrainment, the major definitions, the identified components, the underlying assumptions, and the different entrainment types found in the selected articles are discussed in more detail.

2.3.1 Major definitions

Table 2.5 gives an overview of the major definitions of entrainment in the reviewed literature, covering 88% of the articles.

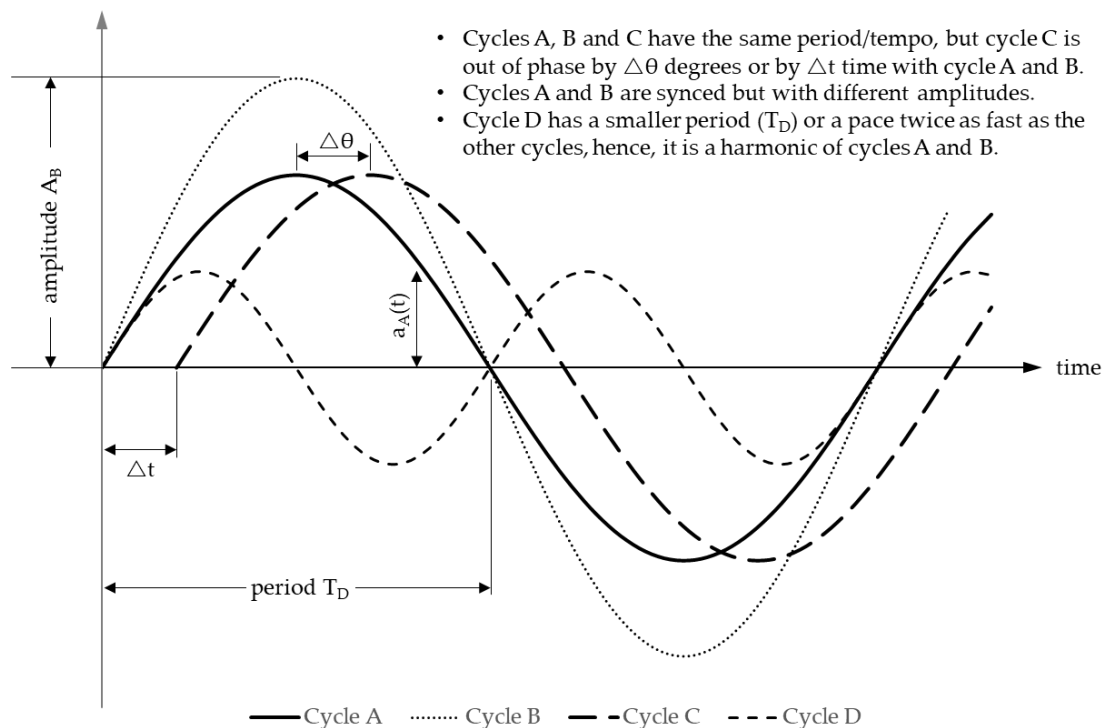
Table 2.5 Major definitions of entrainment found in reviewed articles.

Reference	Definition
Ancona & Chong (1996: 253)	Entrainment defined as "the adjustment of the pace or cycle of activity to match or synchronize with that of another activity." (adjustment could be in the phase, periodicity, or magnitude of the activity)
Perez-Nordtvedt et al. (2008: 788)	"Organizational entrainment is defined here as the processes by which organizations cope with temporal change by synchronizing (i.e., tempo matching and/or phase aligning) their endogenous cyclic activities to those of the external environment (i.e., the <i>zeitgeber</i>)."
McGrath et al. (1984: 23)	"In biological study, the term <i>entrainment</i> means an endogenous body rhythm has been "captured", and modified in its periodicity and its phase, by an external cycle with a rhythm near to the one the body rhythm would have had (in its "natural" endogenous form) had it not been thus captured and modified."
McGrath & Rotchford (1983: 78)	Social entrainment is defined as the "capturing and modification of human activity cycles by various social customs, norms, and institutions."
Bluedorn (2002: 149)	"The term entrainment describes a process over time whereby two or more autonomous rhythmic processes interact with each other in such a way that they adjust towards and eventually lock-in to a common phase and/or periodicity, most often to the rhythm being more powerful or dominant. Afterwards, the processes maintain a consistent relationship."

The definitions of Ancona & Chong (1996) and Perez-Nordtvedt et al. (2008) focus on organizations (61%), while those of Bluedorn (2002) and McGrath et al. (1983, 1984) focus on human or social interaction (27%), informed by entrainment in biology.

2.3.2 Components

Three distinct components are necessary for entrainment to happen: cycles, interaction and adjustment. First of all, entrainment involves two or more cycles. “Cycle” refers to one complete implementation of a phenomenon that is systematic and recurrent (Ancona & Chong 1996; McGrath & Tschan 2004). Repeated cycles develop a rhythm over time, based on the nature of the repetition. A cycle has three distinct features: (1) the speed or pace or periodicity or tempo at which an activity takes place; (2) the phase of the cycle; and (3) the amplitude (Shankar 2014).



Note: An adaptation and extension of Pérez-Nordtvedt et al. (2008) and Ancona & Chong (1996)

Figure 2.5 Features of a cycle.

Based on the work of Pérez-Nordtvedt et al. (2008) and Ancona & Chong (1996), Figure 2.5 gives an overview of those features. The amplitude A is the maximum value reached by cycle, while the period T is the time needed to complete the cycle. The pace is the inverse of the period. For example, the period of cycle D (T_D) is twice as small as the periods of the other cycles, or twice as fast. Sometimes, the magnitude is used interchangeably with amplitude. However, the magnitude is the absolute value reached at a given time t (e.g.,

$a_A(t)$). At time $t = T/4$, then the magnitude is equal to the absolute value of the amplitude of the cycle. Harmonic cycles are cycles with a pace that is a positive integer multiple of the pace of the base cycle. Here, Cycle D is a harmonic of Cycle A and B (i.e., twice the pace).

Note that cycles exist within individuals, groups, organizations, and environments. As a result, organizations have rhythm and depends on the pattern mapped by these cycles (Ancona & Chong 1996).

Second, there needs to be an interaction between the rhythms to adjustⁱ. There are many forms of interaction possible, from weak to stronger coupling. Typically, the interaction is weak; otherwise, they would lose their independence or autonomy and form a new coupled system. However, the periodicities of the rhythms need to be somewhat close to each other (Aschoff 1979). If there is no interaction, the rhythms are still active without any adjustment to each other. Sometimes rhythms that do behave synchronized, while there is no interaction, nor adjustments, do not necessarily imply entrainment. Ancona & Chong (1996) coined this phenomenon pseudo entrainment. Entrainment always involves a natural process of synchronization of at least two rhythms based on interaction.

Next, entrainment involves adjustment of phase and/or tempo to another activity or pacer. The pacer to which weaker cycles entrain is called the zeitgeber or dominant cycle (McGrath et al. 1984; Perez-Nordtvedt et al. 2008). Hence, there are two types of entrainment: phase and tempo (or pace). Phase entrainment refers to the stage in an activity cycle and “when” it adjusts to a pacer, while tempo (or pace) entrainment describes “how fast” the activity adjusts to a pacer. Schmitt & Klärner (2015) describe these types of entrainment as “reaction speed” and “implementation speed” respectively.

Perez-Nordtvedt et al. (2008: 789) built on the work of Ancona & Chong (1996) to suggest that entrainment is a form of organizational adaptation “which involves repetitive adjustments to ongoing, endogenousⁱⁱ environmental cycles over a period of time.” Unlike

ⁱ Interaction can happen directly or indirectly. The phenomenon of entrainment was originally observed indirectly by Huygens when two identical pendulum clocks were weakly coupled through a heavy beam (Willms et al. 2017). In a human body, respiration and heart rhythm influence each other directly (Port et al. 1996).

ⁱⁱ Endogenous activity cycles are here defined as those cycles that “go on whether or not they are in synchrony with any other cycles and whether or not they are in the presence of any outside cyclic forces” (Pérez-Nordtvedt et al. 2008: 788).

adaptation, entrainment consists of changing the timing of activities (when and how fast) and not changing the actual activities themselves.

2.3.3 Assumptions

Assumptions serve as a basis for building models or theories. From these definitions, some general assumptions made by the authors, mentioned in Table 2.5, are summarized in Table 2.6.

Entrained state is temporal (#1). Although the temporal character of entrainment is hardly mentioned in the definitions, the authors see the entrainment state as temporal, as a way of coping with temporal change from the environment or from inside the organization (McGrath et al. 1983, 1984; Ancona & Chong 1996; Perez-Nordtvedt et al. 2008).

Endogenous or naturally occurring rhythms entrain (#2). This assumption suggests that entrained rhythms have to be endogenous or naturally occurring or autonomous, whether they are entrained or not (McGrath et al. 1984; Perez-Nordtvedt et al. 2008). In case rhythms are not endogenous but synchronize with a more dominant rhythm, then this is called resonance (cf. wine glass that resonates with a tone of voice).

Rhythms become mutually entrained to one another (#3) and collectively entrained to more powerful pacers (#4). These assumptions suggest that endogenous rhythms may mutually entrain to one another, and subsequently, they may become collectively entrained to more powerful pacers (McGrath et al. 1984; Ancona & Chong 1996; Perez-Nordtvedt et al. 2008).

Strength of the involved rhythms determines which rhythm entrains to which (#5). Perez-Nordtvedt et al. (2008) note that there are dominant activity cycles as well as weaker ones and that a dominant activity cycle can also be created among organizations themselves. It should not always be imposed by an external environment (e.g., clients, suppliers, institutions).

Table 2.6 General assumptions concerning entrainment.

Assumption	Ancona & Chong (1996)	Perez-Nordtvedt et al. (2008)	McGrath et al. (1983, 1984)
1. Entrained state is temporal.	x	x	x
2. Endogenous or naturally occurring rhythms entrain.		x	x
3. Rhythms become mutually entrained to one another.	x	x	x
4. Rhythms become collectively entrained to more powerful pacers.	x	x	x
5. Strength of the involved rhythms determines which rhythm entrains to which.	x	x	x
6. Rhythms require multiple cycles for entrainment to happen.	x	x	x
7. Entrainment occurs as a way of coping with change.	x	x	
8. Entrained rhythms may initially seem to be resistant to a change in cycle.	x		
9. Entrained rhythms will persist even when the external pacers are removed.	x		

Multiple cycles required for entrainment to happen (#6). Time is also viewed as circular and rhythmic because one needs a repetitive pattern or multiple cycles before entrainment to happen (Pérez-Nordtvedt et al. 2008; McGrath et al. 1984; Ancona & Chong 1996).

Entrainment as a way of coping with change (#7). Entrainment happens as a way of coping with change (Ancona & Chong 1996; Fraisse 1963). If there is no change from the environment or from within the system, there is no need for entrainment.

Entrained rhythms initially resistant to change (#8). Ancona & Chong (1996) mention two other assumptions that are not stated by the other authors: an entrained rhythm may initially seem to be resistant to a change in a cycle and will persist even when the external pacers are removed. However, McGrath et al. (1984) assume that once the entrainment is established, it "persists to some degree even when surrounding temporal conditions have changed" (31).

Note that Perez-Nordtvedt et al. (2008) made an assumption that applies specifically to organizational entrainment, stating that "organizational entrainment is a strategic choice"

(788) and that the ability to entrain may differ from one context to the next. It is based on the fact that humans entrain intentionally, as discussed by Fraisse (1963).

2.3.4 Types of entrainment

Tempo and phase entrainment. As already mentioned above, there are two basic types: tempo and phase entrainment (see also Figure 2.5 – cycles A, B and C). According to Ancona & Chong (1996), tempo entrainment (i.e., at which speed or how fast) occurs when two rhythms operate at the same pace. Perez-Nordtvedt et al. (2008) describe tempo entrainment as synchronizing the period of a cycle to that of another. Phase entrainment (i.e., at which moment in the cycle or “when”), on the other hand, is related to the phase of a cycle and concerns aligning the phases of two or more rhythms typically to the phase of the more dominant rhythm.

Synchronic and harmonic entrainment. The more rhythms are involved, the more phase-locked states are possible. Synchronic entrainment occurs if the rhythms have a similar pace and phase. Harmonic entrainment occurs if there is a harmonic relationship between the rhythms (see Figure 2.5 – cycle D). It “involves the gestalt-like harmonization or meshing of two behaviors as perceived by observers” (Ancona & Chong 1992, 168).

Symmetrical and asymmetrical entrainment. Symmetrical or mutual or participatory entrainment is the case when rhythms do influence each other, such as the crickets chirping in unison and fireflies flashing synchronously (Ancona & Chong 1996; Strogatz & Stewart 1993). Where one rhythm appears to be driving another, the former is referred to as the entraining rhythm or external cue or pacer or zeitgeber, while the adjusting rhythm is sometimes termed the entrained rhythm. Asymmetrical entrainment is the case when the entraining rhythm cannot be influenced (e.g., the daily cycle of light and dark).

Internal (intra-) and external (extra-) entrainment. Besides, each type of entrainment can be internal or external. Internal entrainment or intraentrainment involves entrainment of rhythms of the subsystems within a system, such as the organization’s internal activities and processes. If the rhythms of subsystems entrain with a rhythm outside the system, typical an environmental cue, then it concerns external entrainment or extraentrainment. Most entrainment researchers look at this type of entrainment with the external

environment as the origin of the dominant rhythm (Perez-Nordtvedt et al. 2008). Both external and internal rhythms can act as the entraining rhythm.

Simultaneous and sequential entrainment. These types of entrainment focus on how the phase of each rhythm is involved in the entrainment process, and was first defined by Shi & Prescott (2012). Sequential entrainment is the case where the end of one rhythm or activity cycle is the start of another one, while simultaneous entrainment is the case where the start of two or more rhythms happens at the same phase.

2.4 Review of levels of analysis

Cycles exist within individuals, groups, organizations, and environments. The entrainment concept illustrates the need to examine its application at multiple levels of analysis (Ancona & Chong 1996). Therefore, both authors examined each included article to determine the major level of analysis (individual, group, organizational) and entrainment type (internal, external).

Table 2.7 Levels of analysis and entrainment types found in reviewed articles.

	Internal	External	Both	Total	
Organizational	1	11	5	17	41%
Group	5	5	1	11	27%
Individual	2	2	1	5	12%
Individual + Organizational			4	4	10%
Individual + Group + Organizational	1		3	4	10%
Total	9	18	14		
	22%	44%	34%		

As shown in Table 2.7, in 41% of the articles, entrainment in organizations has been examined at the organizational level, especially with the external environment as the origin of the dominant rhythm (i.e., 11 out of 17 articles, or 65%). Moreover, most entrainment researchers look solely at this type of entrainment (i.e., external entrainment) in 56% of the articles, as already stated by Perez-Nordtvedt et al. (2008). The individual level has been researched the least, with 12%. The cross-level analysis accounts only for 20% of the

articles. A more detailed analysis of this review in time (not shown) does not indicate any trend in the level of analysis.

Which research methodology is used with what type of analysis is shown in Table 2.8. Note that there is only one empirical study at the individual level and another one at both the individual and organizational level. This can (partially) be explained by the focus of this review on entrainment in organizations, but it may also indicate the complexity of this field. However, this level of analysis review highlights a need for additional research – mainly empirical – at the individual level as well as into the multilevel aspect of entrainment in organizations. (Although out-of-scope of this study, the search via the JSTOR journal database on the topic *entrainment* in the *psychology* field did reveal one additional article dealing with emotional entrainment at the individual level by Peräkylä et al. (2015), which is discussed in section 2.5.6.)

Table 2.8 Levels of analysis and used research methodologies.

	Non-empirical	Qualitative	Quantitative	Mixed	Total	
Organizational	5	3	5	4	17	41%
Group	3	1		7	11	27%
Individual	4			1	5	12%
Individual + Organizational	3	1			4	10%
Individual + Group + Organizational	4				4	10%
Total	24	5	5	13		
	51%	11%	11%	28%		

2.5 Thematic review

The authors identified the themes to which the concept of entrainment has contributed the most in the selected articles in this review using an inductive approach. First, they familiarized with the data through reading, reflection and taking notes. Then, they coded the text with labels to describe their content. From the codes that were created, themes were identified. After reviewing the themes for usefulness and accuracy, themes were named. Per theme a distinction is made between empirical and non-empirical articles.

Figure 2.6 and Table 2.9 give an overview. In the following paragraphs, each main theme is discussed in more detail.

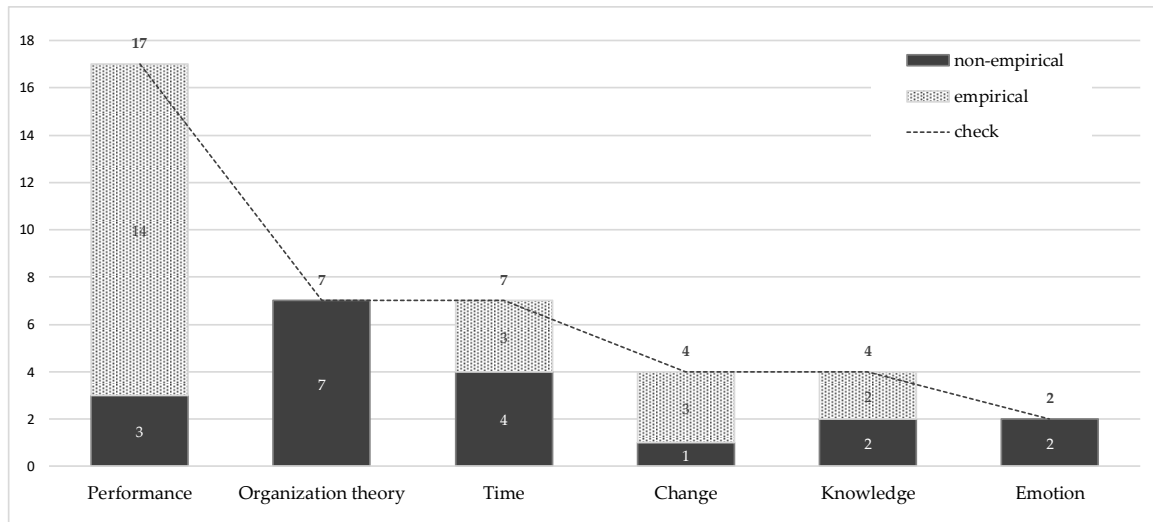


Figure 2.6 Main themes of research.

Table 2.9 Main themes of research.

	Non-empirical					Empirical				Total	
	ind	grp	org	ind+org	ind+grp+org	ind	grp	org	ind+org		
Outcomes		1	1	1			7	7		17	41%
Organization theory			2	2	3					7	17%
Time	2		2			1		2		7	17%
Change					1			3		4	10%
Knowledge		2				1			1	4	10%
Emotion	2									2	5%
	4	3	5	3	4	1	8	12	1	41	
	10%	7%	12%	7%	10%	2%	20%	29%	2%		

Levels of analysis: individual (ind); group (grp); organizational (org)

2.5.1 Outcome

The major theme identified among the selected articles concerns outcomes at the organizational and group level. External entrainment is the type of entrainment that is

mainly discussed at the organizational level within this theme, while both internal and external entrainment are discussed at the group level.

At the organizational level, Pérez-Nordtvedt et al. (2008) argue in their conceptual paper, that organizations can achieve different levels of entrainment with their environment – also called *temporal fit* – which helps to clarify variance in performanceⁱ. They also note that empirical studies at the individual and group level support the relationship between entrainment and performance, but that this has never been applied to the organizational level. Furthermore, they argue that the organizational change of those entrainment elements is a strategic choice of organizational leaders.

Empirical research at the organizational level has been done in several fields. Riolli-Saltzman & Luthans (2001) recommend small high-tech firms to reinvent their culture continually to be aware of their time perception (i.e., sequential or cyclic; short-term vs. long-term) and the entrainment approach among technology, personnel and client cycles to stay ahead of the competition. Research from Dibrell et al. (2009) suggests that the application of time pacing strategies in conjunction with IT is effective in reacting on disruptions in the environment and to increase financial firm performance.

Khavul et al. (2010) demonstrate that organizational entrainment with the environment moderates the relationship between degree, scope, and speed of internationalization and the performance of international new venturesⁱⁱ. Furthermore, Shi & Prescott (2012) show that successful acquisition and alliance initiatives are the results of managing rhythmic strategic actions over time. Besides, Dibrell et al. (2015) demonstrate a positive relationship between external entrainment and firm innovativenessⁱⁱⁱ, and a moderating effect of internal entrainment on this relationship.

Organizational entrainment, as a particular type of temporal adaptation in response to an environmental change (i.e., synchronizing internal rhythmic activities to external pacers), is related to performance (measured through sales growth and profitability), according to

ⁱ Pérez-Nordtvedt et al. (2008) did not define performance explicitly, but they made reference to Burton et al. (2002) where financial performance was considered using the profitability ratio Return on Assets.

ⁱⁱ The new venture's performance was assessed along four dimensions: sales growth, profitability, market share and competitive position since internationalization.

ⁱⁱⁱ Innovativeness is here defined according to Dibrell et al. (2011) as the creation of innovative products, services or processes.

the longitudinal study of Pérez-Nordtvedt et al. (2014). Their cross-sectional data also show that the business owner's perception plays a vital role in how temporal adaptation is selected. More recently, Hopp & Greene (2018) found that venture viability is positively influenced when the business plan is executed in sync with other early developmental activities.

At the group level, Hinds & Bailey (2003) explain how geographical distribution provokes team-level conflict via incongruent temporal rhythms. They argue that distributed teams may have difficulty to establish a shared context and, as a result, to create a shared temporal rhythm as a coordination mechanism.

Empirical research by Waller (1999) with high- and low-performing crews suggests that better performanceⁱ was not associated with working harder, but that higher performance behaviors are embedded in crew processes. High performers clustered their behaviors immediately upon encountering nonroutine events.

Next, Harrison et al. (2003) demonstrate that a priori familiar teams (through for example prior interpersonal experience) have a positive impact on task performance, but those teams are influenced just as strong by an external pacer than other teams. They also concluded that the initial rhythm for a specific task persists across changes in time or task components, but only for that task.

Labianca et al. (2005) argue that a deadline for a project is an environmental stimulus that must be perceived, interpreted and organized through the temporal schema of the group. "Schemata are generalized cognitive frameworks that give form and meaning to experience and contain general knowledge about a domain." (678). Their empirical results suggest that starting times (and midpoints) that are less prototypical of culturally entrained temporal schemata harm task performance, both on the individual and group level. They also suggest that transitions to the next phase of a task are "dynamic and emergent, rather than statically defined at the beginning of tasks" (690).

Woodward et al. (2007) studied the effects of entrained teams and reward structure on team performance (i.e., task speed and accuracy). Results provide support that teams entrained to a cooperatively reward structure exhibit higher levels of performance than

ⁱ Crew performance was measured through three types of behavior: information collection and transfer, task prioritization, and task distribution.

competitively entrained teams. Also, collaboration was found to be a critical mechanism in mediating the relationship between a team's reward structure and their ability to perform better, which is in line with the findings of Harrison et al. (2003) discussed above.

Research of Mohammed & Nadkarni (2011) shows that team performanceⁱ can be maximized by managing members' time urgency and pacing style via team temporal leadership. Team temporal leadership is defined as leader behaviors that aid in structuring, coordinating, and managing the pacing of task accomplishment in a team." (492) (i.e., scheduling, synchronizing and allocating temporal resources).

Member changes in teams and its impact on task performance was studied by Summers et al. (2012). They capture and measure the degree to which change affect individuals and teams through the construct *flux in coordination*. It is an emergent state which describes "a team's ability to convert inputs to outcomes via variation in coordination mechanisms." (317). Based on entrainment theory (Ancona & Chong 1996) and theory of small groups as complex systems (Arrow et al. 2000), Summers and colleagues (2012) argue that "coordination is the most critical process for transforming team inputs into team outputs." (320). They conclude that flux in coordination partially mediates the relationships of both strategic core roles and information transfer to task performance. They highlight that changes in key roles cause much more disruption in team coordination than in other roles, creating higher levels of flux in coordination. However, results show that if a new member in a strategic role possesses higher levels of cognitive ability (than the one departing), the disruption associated with a change is lower (or lower levels of flux in coordination).

Unlike other scholars, Luciano et al. (2018) focus on the potential negative impact of deeply entrained rhythms on team effectiveness with their empirical study. They show a positive relationship between shared team task-specific experience (through aligned team interactions) and team effectiveness in case of infrequent tasks (i.e., more efficient with higher task difficulty), but an inverted U-relationship for frequent tasks, especially with higher task difficulty, due to the generation of complacency.

ⁱ Team performance in this study was assessed "via four items capturing teams' timeliness in meeting project milestones, clients' satisfaction with team performance, and overall performance" (498).

The selected articles discussed above establish a positive relationship between entrainment (or one of its components) and several context-dependent outcomes at the organizational and group level. Perception of the rhythms and pacers in this process is crucial (Riulli-Saltzman & Luthans 2001; Pérez-Nordtvedt et al. 2014; Labianca et al. 2005), as well as one's behaviors (Waller 1999; Mohammed & Nadkarni 2011) and skills to manage rhythmic strategic choices over time (Pérez-Nordtvedt et al. 2008; Shi & Prescott 2012). Only Luciano et al. (2018) warn for the generation of complacency effect with frequently performed tasks.

2.5.2 Organization theory

Some reviewed, non-empirical articles contribute to organization theory in a diverse way. Ancona & Chong (1992, 1996) set the scene for organizational entrainment and became one of the key references in this field. Their work has already been discussed extensively in previous paragraphs.

Schmitt & Klarner (2015) develop a model to explain how firms adapt successfully to long-term and complex environmental changes. They argue that organizations with a cyclical time perspective build higher potential and realized absorptive capacity (i.e., the capacity to acquire and leverage relevant external knowledge) which mediates organizational entrainment. Phase entrainment is mediated by potential absorptive capacity, while tempo entrainment by realized absorptive capacity.

McCarthy et al. (2010) explain how variations in environmental velocity homology (i.e., similar rates and degrees of environmental change over a period of time) significant limit the degree to which a firm's activities or subunits synchronize (internal entrainment) as they seek to operate in time with their respective dimensions of the environment (external entrainment). In low-homology regimes, this leads to firm activities with different paces and directions. However, managers have also the option to change specific environmental dimensions to suit their organizations.

Chiles et al. (2010) develop an approach of 'dynamic creation' on entrepreneurship through which market order can emerge. They posit that entrainment may help explain how market order emerges relying on its self-organizing characteristic (mutual entrainment), as put forward by Ofori-Dankwa & Julian (2001). They contend that "entrainment of entrepreneurs' activity/thought patterns in competitive entrepreneurial markets may

spontaneously create a far-from-equilibrium market order that is both heterogeneous and coherent." (34).

According to Letiche & Hagemeyer (2004), entrainment "focuses on linkages between persons and world, self and other, circumstances and consciousness which can create an 'ability to undertake activity'" (370). They contend that organizations – seen from an entrainment perspective – are about links leading to a shared significance, while mutual (named as *participatory*) entrainment is about acknowledging the rhythms of organizational activity. They further argue that consciousness may be a process similar to entrainment: "a complex mix of stimuli, pre-structures, and interactions that gel into perceptions and experiencing. Cognitive psychology describes consciousness as physiologically and sociologically a form of entrainment (McCrone, 1999)" (380).

Ofori-Dankwa & Julian (2001) suggest looking at entrainment to research high levels of complexities, arguing that the theoretical framework of entrainment can integrate and synchronize the different multilayered temporal orientations and cycles that may exist at the industry, organization, group, and individual levels. They also invite researchers to explore the notion of an *entrainment quotient*, defined as "the relative ease with and speed at which individuals or organizations can shift or adjust their time orientations to effectively entrain or 'detrain.'" (427). Furthermore, they question to what extent managers can be trained in *entrainment management*, defined as "the ability to quickly identify and appropriately respond to the time orientation of a particular society, organization, or individual." (427).

In this theme of *Organization Theory*, entrainment primarily contributed to better understand higher levels of theoretical complexities, both in the environment (Schmitt & Klarner 2015; McCarthy et al. 2010; Chiles et al. 2010), in organizations (Ofori-Dankwa & Julian 2001), and also in consciousness (Letiche & Hagemeyer 2004). To what extent leaders can be trained to quickly identify and effectively entrain and detrain themselves and their organizations, remains a topic for further research.

2.5.3 Time

As entrainment is also discussed in relation to time, both empirical and conceptual in various ways. At the individual level, Tuttle (1997) develops a classification system for

understanding individual differences in temporal orientation. Within the concept of physiological time (next to objective and psychological time), he defines *susceptibility to entrainment* as “the ease with which the individual's waking, sleeping, and peak performance periods are influenced by and can adjust to changes in environmental cycles or rhythms” (362), and is thus a useful measure in determining the relative flexibility of individuals in response to organizational demands for changes in work time arrangements. A person's sleep-wake pattern, peak performance periods and various physiological processes are a manifestation of its circadian rhythm (Aschoff 1979; Tuttle 1997).

A conceptual model of temporal referents and personal schedule changes at work was developed by Blount & Janicik (2001). In this model, each element of an organization's temporal structure conveys a different type of sociotemporal information, based on three elements: (1) the explicit organizational schedules, sequencing patterns and deadlines; (2) the implicit cycles and rhythms of behavior (associated with the phenomenon of entrainment); (3) the organizational cultural norms about time. How actors perceive and evaluate time in organizations depends on the type of temporal information received.

Ancona et al. (2001) argue that the temporal lens for organizational research can stand on its own, next to the strategic design, political and cultural lens. This temporal lens brings variables such as cycles, rhythms, pace, timing, flow, temporal orientation, and the cultural interpretation of time (e.g., based on measured, linear, and exact clock time, or through subjective experience). They argue that applying a temporal lens, “we may discover a fundamentally new view of leadership, organizations, and dynamic capabilities.” (659). Ancona et al. (2001) posit that entrainment plays a crucial role in such temporal leadership. Top management teams exhibiting temporal leadership entrain internal organizational change to the external (technological or competitive) cycles but also act to directly shape those external cycles. As a result, they build dynamic organizational capabilities to operate in the present and the future at the same time.

Bringing nuance in the application of internal and external pacing to align the rhythms in an organization is the topic of Cunha (2004). Promoting a dialectical view on organizational time, he suggests that when organizations favor reflection over action, internal entrainment is emphasized. On the other hand, when the organization favors action over reflection, then external entrainment is more appropriate.

A practice-based perspective on time in organizations was taken by Orlikowski & Yates (2002) to bridge the subjective-objective temporal dichotomy. They suggest looking towards the repetitive actions of individuals establishing or reinforcing the temporal structures that are being captured by external cycles. In other words, through internal organizational entrainment, external entrainment is made meaningful.

Bonneau (2007) uses the concepts of inter-organizational time and entrainment to explain persistent dynamics that pace innovative activities. Inter-organizational time is seen as a dominant temporal institution, a "social coordinating mechanism anchored in history that constrains actors in their perception of reality and the meaning of their actions" (140), at the organizational level. Her field study illustrates the importance of strategic action to the desynchronize and resynchronization process and is an example of symmetrical mutual entrainment (where diverse organizations of an industry mutual entrain to shape a temporal dominant order).

Barnes et al. (2016) draw on entrainment theory to demonstrate how macrolevel business cycles influence individual behavior and time spent working. They argue that this represents an opportunity for organizations to rethink their work-life programs in sync with those business cycles.

To summarize, the contribution of a temporal lens in research, which includes the concept of entrainment, may help us to discover new views on leadership, organizations, and capabilities (Ancona et al. 2001). There are implicit and explicit cycles (Blount & Janick 2001), action and reflection activities (Cunha 2004), subjective and objective temporal structures (Orlikowski & Yates 2002) and, a work-life balance (Tuttle 1997; Barnes et al. 2016). With the discussions on internal and external entrainment, scholars argue that there is an opportunity for organizations to rethink and sync their rhythms through strategic action.

2.5.4 Change

How entrainment enables change is mainly discussed empirically in the reviewed articles. Gersick (1994) studied the pacing of strategic change with a longitudinal case study and shows that midyear transitions significantly play a role, in that they provide staff the time to focus internally and process all the info gathered externally. It was a "way to keep the

organization adaptive in the face of uncertainty." (30). Related to her work, is the work of Brown & Eisenhardt (1997). They suggest that time-paced, rhythmic transitions are key to understand continuous change. Those transitions may entrain organizations to their environment, and may also enable organizations to influence the pace of their industries. Besides, Brown and Eisenhardt found a positive link between successful product portfolio and post-study firm performance. In their ethnographic study, Perlow et al. (2002) highlight the broader role external pacers play to enable change and ensure the speed of organizational activity stays in sync with the environment, but also in preventing the acceleration of decision speed.

In his conceptual paper, Huy (2001) argues that large-scale change requires change agents to possess temporal capability skills (i.e., sequence, time, pace) to combine the various intervention ideal types effectively. Besides the time perspective of pacing, and the conception of time, entrainment – both external and internal – is another temporal assumption for the proposed intervention ideal types. External organizational entrainment is considered in combination with multilevel internal entrainment to address the limited attention given to the organization's internal capabilities or individual issues.

Under this theme *Change*, earlier studies highlight the role of pacing (one particular aspect of entrainment) in change, both through internal pacers (Gersick 1994; Brown & Eisenhardt 1997) and external pacers (Perlow et al. 2002). Huy (2001), on the other hand, raise the importance of both internal and external entrainment, as well as the temporal capability skills from change agents to manage change effectively.

2.5.5 Knowledge

Based on empirical data, Söderlund (2010) illustrates a model where the success of change initiatives is related to the quality of multilevel knowledge integration, a form of "knowledge entrainment," which is closely associated with the dynamic phenomenon of absorptive capacity. In another empirical study, Lervik et al. (2010) argue that temporal structures, through the mechanisms of external and internal entrainment, are important to facilitate or inhibit the development of new understanding. They posit that learning as a collective accomplishment "hinges on the individual learner's cognitive and embodied expertise as well as on his or her ability to mobilize ambient material resources and social

relationships that enable new understandings." (299). In other words, it depends on the learner's ability to influence internal entrainment.

Anand et al. (2003) hypothesize that teams with low levels of internal entrainment exhibit lower levels of knowledge integration. Moreover, De Nito et al. (2013) argue that knowledge creation requires a deeper understanding of the knowledge processes, of problem-solving cycles, and the ability of people to take part in this creation process. Sometimes knowledge creation relies on cyclical rather than an incremental perception of time (Remington & Söderholm 2009), as this is evidenced in new management methods, such as agile.

2.5.6 Emotion

The theme of *Emotion* has only been discussed in two conceptual articles. Kelly & Barsade (2001) propose an organizing model to understand how affect in groups develop to a group's emotion. They draw on implicit and explicit processes through which this emotion arises. Behavioral entrainment is considered as an implicit process for creating group affect. It refers to "the completely nonconscious processes by which one individual's behavior is adjusted or modified in order to coordinate or synchronize with another." (109), including coordination of body movements, affect and attitudes. A curvilinear relationship between synchronicity and affect is hypothesized by Warner et al. (1986), "with moderately synchronous social interactions rated most positively." (in Kelly & Barsade 2001, 110).

Goss (2007), on the other hand, rely on the Interaction Ritual Chain theory (Collin 2004) to explain effective business innovation. This theory suggests that individuals are attracted to some situations and away from others based on their "emotional energy," which sets the level of emotional entrainment. The ability of individuals to gain emotional energy through successful participation in interaction rituals determines the ability to enact Schumpeterian entrepreneurialism. Such rituals are composed of group assembly, barriers to outsiders, a mutual focus of attention, and a shared mood. The group's emotional energy transmutes shared mood into collective effervescence via entrainment.

This theme introduces two new applications of entrainment that drive emotions: behavioral and emotional entrainment. Successful participation in those processes is key.

However, Kelly & Barsade (2001) note that the interaction intensity plays a role too (cf. amplitude in Figure 2.5).

2.6 Conclusion and directions for future research

This literature review advances our understanding of entrainment in organizations and contributes to the general theoretical debates to bring more awareness to integrate time-related dimensions in future organizational and process studies. Looking at the limited growth in articles relating to entrainment in organizations, the temporal lens of entrainment still bears the significant potential to add value in several fields of management and organizational behavior.

The review illustrates the various variables that play a role in the process of entrainment and assists scholars in describing the phenomenon more clearly (e.g., internal vs. external cycles; entraining and entrained cycles; symmetrical and asymmetrical entrainment; reaction and implementation speed; phase and tempo entrainment). Although limited in scope, this study provides valuable insights on the understanding of entrainment in organizations. It confirms that there is a common understanding as to what constitutes entrainment in organizations, but due to its complexity and vocabulary used (with confusing meanings), it is overwhelming. Pace, (reaction) speed and tempo all describe the frequency or period of a cycle, while phase, stage and implementation speed are words to describe the phase of a cycle. Independent cycles are also called autonomous, or endogenous, or naturally occurring. In addition, the word *entrainment* is often replaced by synchronization or resonance which does not cover the whole phenomenon. The selected articles cover fifteen different types of entrainment. Some of them have the same meaning (e.g., symmetrical or mutual or participatory), some depict only a part of the entrainment process (e.g., intra- and extraentrainment).

The themes that emerged from the analysis give an overview of how entrainment is used in different research fields to explain particular organizational phenomena, both at the individual and organizational level. Foremost, it supports the positive relationship between entrainment and organizational outcomes but also warns for complacency in specific cases. Moreover, this review highlights the use of the concept of entrainment to explain higher levels of theoretical complexities but helps likewise to argue the

opportunity for organizations to sync their rhythms through strategic action while pacing their decision speed. In addition, the review makes specific contributions to the theoretical debate and calls for more time-related research in strategic change, put forward by Kunisch et al. (2017). Organizational entrainment contributes to the call for the appreciation of polyphony to clarify its multidimensional and complex nature. Knowledge entrainment can help to understand how change agents integrate knowledge and increase the speed of learning in organizations, while emotional and behavior entrainment can contribute to better explain the role of emotions in strategic change. Hence, entrainment is not only a temporal variable in the mapping of activities, as proposed by Ancona et al. (2001) and shown in Figure 2.1, but also a temporal variable impacting the actors involved.

This literature review also identified two major gaps. First, exploration of organizational intraentrainment has been limited although it is essential for improved organizational outcomes (Hopp & Greene 2018, Perez-Nordtvedt et al. 2008). McGrath et al. (1984) point out that humans show quite strong patterns of intraentrainment in comparison to many animals who are strongly entrained to an external pacer (e.g., dark/light cycles). In addition, from the concept of entrainment in biology, Pittendrigh (1972) argues that such intraentrainment is the central problem for understanding how all these rhythms are organized in biological systems, including human beings. Second, the use of leadership constructs to foster organizational entrainment has been scarce despite that perception of the rhythms and pacers in this process of entrainment are crucial (Riolfi-Saltzman & Luthans 2001; Pérez-Nordtvedt et al. 2014; Labianca et al. 2005), as well as the skills to manage rhythmic strategic choices over time (Pérez-Nordtvedt et al. 2008; Shi & Prescott 2012; Bonneau 2007; Huy 2001), or the ability to take part in this entrainment process (Lervik et al. 2010; De Nito et al. 2013). In addition, Ofori-Dankwa & Julian (2001) question to what extent managers can be trained in entrainment management. Ancona & Tushman applied the temporal lens on leadership and created the term *temporal leadership* to bring cycles, time perspectives, temporal structures and timeless visions into the foreground (Ancona et al. 2001). To the best of my knowledge, only the empirical research of Mohammed & Nadkarni (2011: 502) expanded this nascent notion of temporal leadership to the team and highlight “the importance of temporal leadership behaviors in effectively managing teams”. Despite these efforts, the use of leadership research or leadership constructs to foster organizational entrainment has been scarce.

Following Chiles et al. (2010), another future research direction is the understanding of entrainment in self-organizing processes. Also, McCarthy et al. (2010: 622) “urges researchers to examine both the complexity and diversity of the construct and its effects on organizations”. Exploring the entrainment quotient, as defined by Ofori-Dankwa & Julian (2001), how it relates to organizations and how it could be measured, are other additional future directions. From a methodological viewpoint, taking into account the nature of entrainment and that only 20% of the articles in this review are multilevel and 10% longitudinal, there is a distinct need for more longitudinal multilevel research to capture its functioning.

This review has its limitations. A major one is the selected keywords used in the search. Although the keyword combinations were meant to be broad and inclusive, as well as the content type, some relevant literature might have been overlooked. Moreover, the word “entrainment” is not always used to describe the same process of entrainment (e.g., Gherardi & Strati 1988). Another major limitation identified, is the risk of bias in including or excluding articles for this review.

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Appendix

The descriptions were retrieved from the respective websites on 18th of August 2018.

EBSCO Business Source Complete

(<https://www.ebsco.com/products/research-databases/business-source-complete>)

EBCO's Business Source Complete is a database with premium full-text content and peer-reviewed business journals, covering all disciplines of business and economics. It includes nearly 1 300 active full-text peer-reviewed journals.

Emerald Insight (www.emeraldinsight.com)

Emerald Publishing is a global publisher linking research and practice, founded in 1967. Today, it nurtures fresh thinking in applied fields, now also including health and social care, education and engineering. Emerald manages a portfolio of nearly 300 journals, more than 2 500 books, and over 1 500 teaching cases.

JSTOR (www.jstor.org)

It provides access to more than 12 million academic journal articles, books, and primary sources in 75 disciplines. The collections include top peer-reviewed scholarly journals as well as respected literary journals, academic monographs, research reports from trusted institutes, and primary sources. JSTOR works with a diverse group of nearly 1 200 publishers from more than 57 countries and includes more than 2 000 top scholarly journals in the humanities, social sciences, and sciences.

ScienceDirect (www.sciencedirect.com)

It is Elsevier's leading platform of peer-reviewed scholarly literature. University libraries and institutions offer ScienceDirect access to their communities of researchers. Researchers, teachers, students, healthcare and information professionals use ScienceDirect to improve

the way they search, discover, read, understand and share scholarly research. ScienceDirect combines authoritative, full-text scientific, technical and health publications with smart, intuitive functionality so that users can stay informed in their fields and can work more effectively and efficiently. ScienceDirect provides access to articles from up to 3 800 journals and over 37 000 book titles.

Web of Science Core Collection (www.clarivate.com/products/web-of-science)

The Web of Science platform offers an unrivaled breadth of world-class research literature linked to a rigorously selected core of journals and uniquely discover new information. The platform connects the Web of Science Core Collection to regional citation indexes, patent data, specialized subject indexes, and an index of research datasets, all in all totaling over 33 000 journals.

Refining the entrainment lens with learnings from physiological entrainment

*This chapter is based on articles published in the journal *Advances in Management* (Sandra & Nandram 2013) and in the *Journal of Management, Spirituality & Religion* (Sandra & Nandram 2020).*

Still to date, organizational entrainment has been discussed mainly to its external environment, although the organization's internal activities should be entrained as well for improved organizational outcomes (e.g., Perez-Nordtvedt et al. 2008; Shi & Prescott 2012). The literature review highlights that entrainment is not only a temporal variable in the mapping of activities, but also one impacting the individuals involved. For knowledge integration and creation, internal and external entrainment are crucial to facilitate the development of new understanding, to take part in the cyclic creation process, and to mobilize material resources and social relationships (Lervik et al. 2010; Anand et al. 2003; De Nito et al. 2013). As often done by organizational scholars (Pérez-Nordtvedt et al. 2008), the research in this chapter looks at a different field, human physiology, to learn more about intraentrainment, addressing the gap discussed in the previous chapter. More precisely, what can we learn from physiological entrainment in the human body to inform organizational intraentrainment? How can organizational entrainment be enhanced? It starts with introducing an overall framework of entrainment, Integral Entrainment Matrix, to position intraentrainment more clearly against other types of entrainment. Then, physiological entrainment is discussed at the individual level, with a focus on intraentrainment and the functioning of the human heart, in order to argue that an additional variable is currently missing in entrainment theory to denote the quality of interaction. Finally, organizational entrainment is refined with these findings.

3.1 Integral Entrainment Matrix

Although the working of entrainment is simple, it is apparent from the review in the previous chapter that the phenomenon of entrainment is complex. There are numerous rhythmic cycles in organizations, each with its own pace and phases, on which organizations can act. Each cycle can mutually entrain with other cycles within its own system or between systems at the same level or being entrained at different levels. Building further on these findings, the different types of entrainment (see 2.3.4) can be categorized in three broad categories:

- (1) *where* entrainment occurs (within or between systems);
- (2) *whereby* or by which rhythm (symmetrical or asymmetrical rhythms);
- (3) *how* rhythms eventually are entrained (tempo, phase, synchronic, harmonic, simultaneous, sequential).

Because the latter category is independent of the other categories, a matrix can be created, defined as the *Integral Entrainment Matrix* (Figure 3.1) combining the first two categories: whether the entrainment occurs within a system (inner) or between systems (outer); and whether rhythms mutually entrain each other (symmetrical) or not (asymmetrical).

	Inner entrainment (within a system)	Outer entrainment (between systems)
Symmetrical entrainment	Intra-entrainment	Inter-entrainment
Asymmetrical entrainment	Extra-entrainment	Exter-entrainment

Figure 3.1 Integral Entrainment Matrix.

Seen the complexity of entrainment, such a matrix can serve the following purposes. First, it helps to make a better distinction between the different types of entrainment and the level on which entrainment takes place (e.g., individual - group - organizational). Next, it highlights the integral nature of entrainment: entrainment within a system cannot be seen as standalone; it continuously entrains with other systems but is also entrained by the

environment of the system. Finally, it offers a framework for other researchers to position their current and future work about entrainment.

The proposed Integral Entrainment Matrix can easily be understood when explained at the individual level using the human body as reference system. In this case, *intraentrainment* (upper left) is a type of entrainment describing the phenomenon where two or more rhythms within a human body, such as respiration and heart rhythm, influence each other and become synchronized. This type of phenomena has also been studied in physical activity and in speech by Port et al. (1996), in the locking of step and inhalation cycles in jogging (Bramble & Carrier 1983), between respiration and heartbeat in high performance swimmers (Schäfer et al., cited by Glass 2001), between the heart and the brain (McCraty et al. 2009). If one looks at social interactions, individuals can mutually entrain their rhythms (Waller 1999; Kelly & Barsade 2001). This type of entrainment is generally defined as *interentrainment* (upper right), also called *interpersonal* or *collective* entrainment at the individual level. This type is *symmetrical* as one rhythm is influencing the other. The study of entrainment of individuals to environmental rhythmic stimuli is a part of chronobiology (Chapple 1970) and here defined as *asymmetrical entrainment*, in that the individual cannot influence the entraining rhythm (e.g., the cycle of light and dark). In such a situation, a human body is 'forced' to adjust to external cycles without being able to influence them. When a human system as a whole is entrained by the environment, this is defined as *exterentrainment* (lower right). When the environment entrains parts of a human system, then this is identified as *extraentrainment* (lower left) (Perez-Nordtvedt et al. 2008).

As noted above, the Integral Entrainment Matrix depends on the level on which entrainment takes place. Ofori-Dankwa & Julian (2001) argue that the theoretical framework of entrainment can integrate and synchronize the different multilayered temporal orientations and cycles that may exist at the industry, organization, group, and individual levels. The proposed *Multi-level Integral Entrainment Matrix* can demonstrate such integration of multiple levels (Figure 3.2) where intraentrainment is split into another matrix at a more detailed level. To phrase it differently, what cannot be influenced on one level, can be influenced on a higher level (level +1). For example, macrolevel business cycles influence individual behavior and time spent working (Barnes et al. 2016). Hence, individuals need to adapt to these cycles (=asymmetric entrainment at individual level 0). Only at the organizational level (level +1), or higher, can those cycles be influenced.

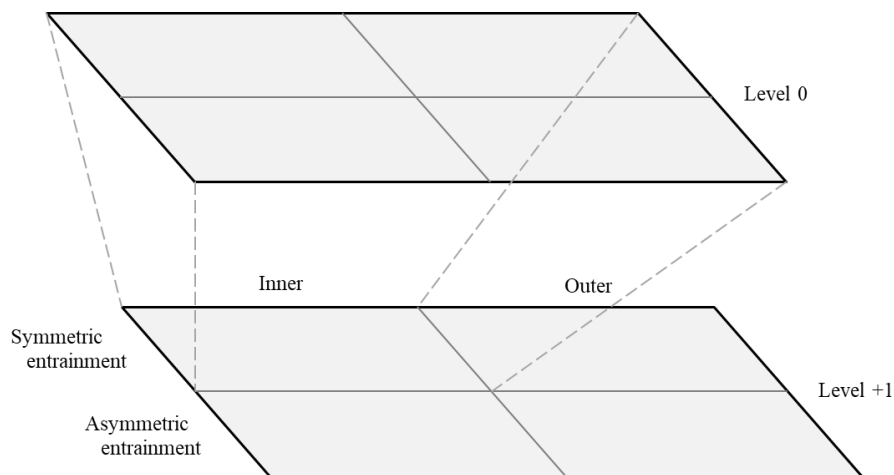


Figure 3.2 Multi-level Integral Entrainment Matrix.

3.2 Learnings from physiological entrainment

3.2.1 Intraentrainment

Entrainment does not always demand an external rhythmic stimulus (Ancona & Chong 1996), either environmental or interpersonal. Intraentrainment involves entrainment of rhythms of subsystems within a system, but to which internal pacer do subsystems entrain within the human body? To find an answer to this question, the physiological functioning of the human heart and its importance for intraentrainment is further discussed.

Researchers at the Institute of Heartmath identified that the heart continuously sends signals to parts in the brain involved with perception, cognition, and handling of emotions (Armour & Ardell 1984; Lacey & Lacey 1970; Frysinger & Harper 1990; McCraty, Tiller & Atkinson 1996; Childre & Martin 1999). Next to this neurologically way, other research disclosed that the heart is the most powerful electromagnetic field through which it also interacts with the brain (Song, Schwartz & Russek 1998). The electrical field of the heart is approximately 60 times greater in amplitude than brain waves, while its magnetic component is around 5000 times stronger. Thus, it is the heart that is the strongest biological oscillator in the human system pulling other systems into entrainment and, as a result, significantly influences how we perceive and react to the world (Lacey & Lacey

1970; Frysinger & Harper 1990; McCraty, Tiller & Atkinson 1996; Childre & Martin 1999).

Further research has identified that elevated emotions – such as appreciation, care, nonjudgment, and forgiveness – have an important influence on the heart and are essential for bringing a human system into coherence (Childre & Martin 1999). In physics, coherence describes two or more waves that are phase locked, while in physiology, it describes the degree of order and stability of the rhythm (McCraty 2004). Elevated emotions are associated with a higher degree of coherence within the heart's rhythm (also called *auto-coherence*) as well as increased coherence between other rhythms within the same system (also *cross-coherence* or *entrainment*) (McCraty 2004). For example, in a state of deep love or appreciation, brain waves entrain with heart rhythms at the resonant frequency of 0.1 Hz (McCraty, Tiller & Atkinson 1996; McCraty, Rozman & Childre 1999). The outcome of such an increased internal coherence is enhanced cognitive performance, sensitivity, and mental clarity as well as increased emotional stability and well-being (McCraty & Atkinson 2003; Childre & Cryer 2000). Moreover, McCraty (2004: 7) argues that “the ability to sense what other people are feeling is an important factor in allowing us to connect or communicate effectively with others. The smoothness of flow in any social interaction depends to a great extent on the establishment of spontaneous entrainment between individuals.” Heart Rate Variability (HRV) is the primary indicator used to assess such coherence (McCraty 2017). HRV can be looked at as an important measurement of how well we're balancing our lives mentally and emotionally; it is a measure of the flexibility of our heart and nervous system, and as such reflects our health and fitness (Tiller et al. 1996). Elevated emotions are associated with a higher degree of coherence within the heart's rhythmic activity (*auto-coherence*) as well as increased coherence between different oscillatory systems (*cross-coherence*) (McCraty & Singer 2002). Research from Goldberger et al. (2002) that a healthy heart is a (multi)fractalⁱ heart and that a clear correlation of the heart variability exists

ⁱ Fractal geometry underlies important aspects of the functioning of the human heart (Peskin & McQueen 1994). The term *fractal* was coined by the French mathematician Benoît Mandelbrot and was derived from the Latin *fractus* meaning "broken" or "fractured" (Mandelbrot 1982). It satisfies two conditions: self-similarity and fractional dimensionality. Self-similarity means that “an object is composed of sub-units and sub-sub-units on multiple levels that (statistically) resemble the structure of the whole object” (Goldberger et al. 2002: 2466). The second criterion for a fractal object is that it has a fractional dimension (and not an integer one). A mathematical fractal is based on an equation that undergoes iteration, a form of feedback based on recursion valid on all scales (Briggs 1992).

indicating the heart's coherence, or adaptive capacity to respond to unpredictable stimuli. Furthermore, they argue that the observed fractal patterns demonstrate that living organisms strive to maintain an adaptive variability, so that they don't get locked into one mode of behavior.

As discussed earlier (cf. section 2.5.2), Letiche & Hagemeyer (2004) argue that consciousness may be a form of intraentrainment of stimuli and pre-structures resulting into perceptions and experiences. Furthermore, Lervik et al. (2010) discuss that learning depends on the individual's ability to influence intraentrainment. Similar but at the group level, Anand et al. (2003) hypothesize that teams with low levels of intraentrainment exhibit lower levels of knowledge integration.

To summarize, for intraentrainment at the individual level, it is suggested that the heart is the strongest biological oscillator in the human body, autonomous, pulling other systems into entrainment. This entails that the condition of the heart plays an important role in the efficacy of the entrainment process and is significantly influenced by elevated emotions. The healthier the heart, the more coherent are the rhythms in the human system, resulting in enhanced cognitive performance, sensitivity, mental clarity, emotional stability, and well-being.

3.2.2 Interentrainment

Individuals mutually entrain their rhythms with others, also called *interentrainment*. Emotional entrainment (Goss 2007) and behavioral entrainment (Kelly & Barsade 2001), as discussed in the thematic review (section 2.5) are examples of such interentrainment at the individual level. (Additional examples are given below, in section 3.2.4.)

3.2.3 Extra- and extereentrainment

In the reviewed literature, discussed in the previous chapter, there are numerous examples of entrainment to an environmental pacer at the group and organizational level, but not at the individual level. Therefore, this section discusses how the rhythms of the heart and the brain entrain with the environment, more precisely, the Schumann resonance.

Research of Becker (1990a, 1990b) shows that brainwaves regulate the overall operation of the nervous system, including the state of consciousness. Brainwaves are not constant in frequency but vary from moment to moment. They are susceptible to entrainment by external rhythms during the so-called “free-run”, lasting from 5 to 25 seconds. The Schumann resonance is such an external rhythm, originated by the lightning activity between the ionosphere and the earth, with an average frequency of approximately 7-10 Hz depending on the properties of the ionosphere (Schumann 1952; Galejs 1972; Balser & Wagner 1960). According to Oschman (1997), those frequencies have considerable overlap with the biomagnetic fields produced by the heart and the brain, but they are many times stronger. Furthermore, he notes that brainwave entrainment by the Schumann resonance during the ‘free-run’ period happens when the individual is in a relaxed or meditative state (i.e., intraentrainment), suggesting that brainwaves regulate the nervous system and state of consciousness. Seto et al. (1992) showed that the biomagnetic field projected from the hands in such a situation is much stronger than the brainwaves, indicating that amplification of at least 1000 times takes place somewhere in the body. This type of entrainment is here defined as extraentrainment because rhythms within a system are entrained by an external pacer. A person’s sleep-wake pattern, peak performance periods and various physiological processes are other examples of this type of entrainment (Aschoff 1979; Tuttle 1997), as discussed earlier in section 2.5.3. How the day-night cycle influences work-life balance or working rhythm is an example of exoterentrainment in an organizational setting. A team’s reward structure influencing collaboration in a team is another example, as studied by Woodward et al. (2007) (see section 2.5.1).ⁱ

3.2.4 Integral Entrainment Matrix applied to collective resonance

Levi (2003: 3) gathered and interpreted experiences of *collective resonance*, defined as “a felt sense of energy, rhythm, or intuitive knowing that occurs in a group of human beings and positively affects the way they interact toward a common purpose”. She postulates that this collective resonance could be a result of entrainment of bodily rhythms. Her study identified a number of shifting-factors, i.e., factors that influenced their group’s shift into

ⁱ Note that Dibrell et al. (2015) found a similar influence at the organizational level. They identified a positive relationship between extraentrainment and firm innovativeness, and a moderating effect of intraentrainment on this relationship.

collective resonance. Figure 3.3 shows these factors mapped onto the Integral Entrainment Matrix (individual level).

	Inner entrainment	Outer entrainment
Symmetrical entrainment	<p>Intraentrainment</p> <ul style="list-style-type: none"> - Vulnerability - Silence to connect with oneself 	<p>Interentrainment</p> <ul style="list-style-type: none"> - Silence to connect with other - Silence/listening to acknowledge what is - Truth-telling, i.e., speak with own voice about own truth - Container contraction, e.g., through human bodies sitting in a circle - Shared intent
Asymmetrical entrainment	<p>Extraentrainment</p> <ul style="list-style-type: none"> - Silence to connect with environment - Place or space, e.g., building, environment - Sound or vibration, i.e., music, singing, speech 	<p>Exterentrainment</p> <ul style="list-style-type: none"> - Silence to connect with environment - Container contraction through, e.g., darkness, movement

Note: Factors in descending order of consensus

Figure 3.3 Factors that influence collective resonance (adapted from Levi 2003).

The matrix shows that many of these shifting-factors are related to interentrainment. However, some are related to several quadrants at once or just one. The most widely shared factor for collective resonance was an acknowledged feeling of vulnerability (expressed by study participants as a sense of not knowing), self-revelation, openness to learning and growth. Another widely shared factor was silence to connect with oneself, one another and the environment (all quadrants).

3.3 Organizational entrainment refined

Perez-Nordtvedt et al. (2008: 788) defined organizational entrainment as “the processes by which organizations cope with temporal change by synchronizing (i.e., tempo matching and/or phase aligning) their endogenous cyclic activities to those of the external environment (i.e., the zeitgeber).” Still to date, organizational entrainment has been discussed mainly to its external environment, although the organization’s internal

activities should be entrained as well for improved organizational outcomes (e.g., Perez-Nordtvedt et al. 2008; Shi & Prescott 2012). As stated before, for knowledge integration and creation, internal and external entrainment is crucial to facilitate the development of new understanding, to take part in the cyclic creation process, and to mobilize material resources and social relationships (Lervik et al. 2010; Anand et al. 2003; De Nito et al. 2013). This study proposes four refinements to the entrainment theory to highlight this importance of both internal and external entrainment.

Based on the learnings of physiological intraentrainment and heart coherence (see 3.2.1), the first refinement introduces *coherence* as another variable to be added to the theory of entrainment, next to the three variables already discussed earlier: cycles, interaction and adjustment.ⁱ It can be defined as follows:

Coherence is defined as the degree of entrainment across all cycles, both in phase and in tempo. It is a measure for the degree of order, stability and flexibility of these cycles.

Second, based on the learnings of physiological entrainment discussed above and applying the concept of coherence to the Integral Entrainment Matrix, the findings herein lead to the following proposition:

The degree of entrainment, described by the term coherence, is enhanced when entrainment occurs at the same time within the system, between systems, and with the environment (i.e., in all quadrants of the Integral Entrainment Matrix at the same time).

Next, Ofori-Dankwa & Julian (2001: 427) invite researchers to explore the notion of an *entrainment quotient*, defined as “the relative ease with and speed at which individuals or organizations can shift or adjust their time orientations to effectively entrain or ‘detrain.’” As a third refinement to organizational entrainment, this study proposes that *coherence* could be regarded as such an entrainment quotient. From the learnings of physiological entrainment, heart coherence is considered as a measure of the flexibility of our heart and

ⁱ In business, the term “congruence” is often used to indicate a quality of corresponding (e.g., value congruence - Fry 2003). Entrainment deals with rhythms, periods and phases. Therefore, the term “coherence” is more appropriate to use. Moreover, it is a common concept in physiology, as indicated earlier.

nervous system, and as such reflects our health and fitness (Tiller et al. 1996), or adaptive capacity to respond to unpredictable stimuli while maintaining adaptive variability (Goldberger et al. 2002). Similar to heart coherence, the refinement can be described as follows:

Coherence of an entrained system could be regarded as the entrainment quotient indicating how well and fast such a system responds to internal and external pacers.

Finally, based on the definition of entrainment proposed by Bluedorn (2002)ⁱ and the proposed Integral Entrainment Matrix, organizational entrainment can be re(de)defined to indicate more clearly the different types of entrainment, as well as the choice that organizations have to entrain or not (cf. Perez-Nordtvedt et al. 2008).

“Organizational entrainment is a process over time whereby autonomous rhythms interact with other rhythms within and outside the organization in such a way that they adjust towards and eventually lock-in to a coherent phase and/or pace, maintaining a consistent relationship most often to the rhythm being more powerful or deliberately chosen.”

3.4 Conclusion, limitations and future research

The objective of this study was to explore organizational intraentrainment in more detail as it is considered as an important element for improved organizational outcomes (e.g., Perez-Nordtvedt et al. 2008; Shi & Prescott 2012). Before doing so, the Integral Entrainment Matrix was introduced to distinguish four major types of entrainment: (a) intraentrainment and (b) interentrainment; (c) extraentrainment and (d) exterentrainment. The multi-level version of the Integral Entrainment Matrix attempts to demonstrate how these levels may integrate, as proposed by Ofori-Dankwa & Julian (2001).

ⁱ Bluedorn (2002: 149) defined entrainment as “a process over time whereby two or more autonomous rhythmic processes interact with each other in such a way that they adjust towards and eventually lock-in to a common phase and/or periodicity, most often to the rhythm being more powerful or dominant. Afterward, the processes maintain a consistent relationship.”

To explore organizational intraentrainment in more detail, the learnings from physiological entrainment and, more precisely, the functioning of the human heart has led to proposing three refinements to the theory of organizational entrainment: (1) coherence as an additional variable to the entrainment theory, defined as the degree of entrainment, or quality of interaction, across all cycles, both in phase and in tempo; (2) coherence is enhanced when entrainment occurs in each quadrant of the Integral Entrainment Matrix; (3) coherence as entrainment quotient as the relative ease to effectively entrain or detrain. Based on these refinements and the proposed Integral Entrainment Matrix, a redefinition of organizational entrainment arose and was given.

In terms of practical relevance, this study offers an overall framework to researchers and practitioners to use for mapping rhythms in organizations onto the four quadrants. Such mapping immediately identifies to which rhythms their work or organizations are exposed and which rhythms they can influence or not. Hence, it helps to prioritize managerial attention.

The study presented in this chapter is limited in scope because intraentrainment has only been explored from a physiological entrainment perspective inspired by the functioning of the human heart. Although, the heart is the strongest biological oscillator in the human system (see e.g. Childre & Martin 1999), intraentrainment could be studied analyzing other biological processes in the human system, such as the endocrine system. Applying learnings from quantum or astrophysics could be another alternative or future research direction to challenge and to increase the current understanding of the complex nature of entrainment.

3.5 References

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Driving organizational intraentrainment through spiritual leadership

This chapter is based on the article published in the Journal of Management, Spirituality & Religion (Sandra & Nandram 2020) and presented at the virtual Annual Meeting of the Academy of Management 2020 (symposium #14592). An earlier version was presented at the 13th European Conference on Management, Leadership and Governance (Sandra & Nandram 2017).

Many researchers note that the perception of the rhythms and paces in the entrainment process is crucial (Riolfi-Saltzman & Luthans 2001; Pérez-Nordtvedt et al. 2014; Labianca et al. 2005), as well as the skills to manage rhythmic strategic choices over time (Pérez-Nordtvedt et al. 2008; Shi & Prescott 2012; Bonneau 2007; Huy 2001), or the ability to take part in that process (Lervik et al. 2010; De Nito et al. 2013). Ofori-Dankwa & Julian (2001) question to what extent managers can be trained in entrainment management. Ancona & Tushman applied the temporal lens on leadership to bring cycles, time perspectives, temporal structures and timeless visions into the foreground (Ancona et al. 2001). To my knowledge, only the empirical research of Mohammed & Nadkarni (2011) highlight the importance of leadership in such a situation to effectively manage teams. Despite these efforts, the use of leadership research or leadership constructs to foster organizational entrainment has been scarce.

As discussed in the previous chapter, entrainment does not always demand an external rhythmic stimulus, but intraentrainment is essential for improved organizational outcomes (Hopp & Greene 2018, Perez-Nordtvedt et al. 2008). In a human body, for example, it is the heart that plays an important role in the efficacy of the entrainment process, pulling other systems into entrainment. Similar to the heart, what kind of leadership construct can drive intraentrainment in organizations? In other words, what kind of leadership construct can be applied at each organizational level, is autonomous, entrains other systems, and

enhances organizational outcomes and well-being? The study in this chapter posits that spiritual leadership is such a construct and argues that applying spiritual leadership at the individual and group level within an organization can drive organizational intraentrainment.ⁱ First, a brief overview of spiritual leadership is provided, highlighting the essential elements for this study. Second, the entrainment lens is applied to the model of spiritual leadership to refine its working and understanding. Next, this revised model of spiritual leadership is used to contend that it can drive entrainment in organizations. The chapter closes discussing the theoretical and practical relevance of this study, its limitations and highlights several avenues for further research.

Before proceeding, what is understood by leadership? According to Kouzes & Posner (1987: 30), leadership is “the art of mobilizing others to want to struggle for shared aspirations”. It is a complex interaction between the designated leader and the environment, both social and organizational (Fiedler 1996), that engages everyone in the community through a social process (Barker 1997; Drath & Palus 1994; Wenger & Snyder 2000). Hence, everyone is considered a leader (Draft 1998). Day (2001) notes that leader development emphasizes to build intrapersonal competence, while leadership development is focused on building interpersonal competence.

4.1 Spiritual leadership theory

Spiritual leadership theory is a causal leadership theory for organizational transformation designed to create an intrinsically motivated organization that is capable of continuous learning and adapting to the rapidly changing environment (Fry 2003, 2005; Fry & Whittington 2005; Fry & Slocum 2008). It has been extensively tested and validated in a variety of settings, and support a significant positive influence of spiritual leadership on employee life satisfaction (in terms of joy, serenity and peace), organizational commitment and productivity, and sales growth (Malone & Fry 2003; Fry, Vitucci & Cedillo 2005; Fry & Matherly 2006; Fry et al. 2007; Fry, Nisiewicz & Vitucci 2007). Spirituality in this model concerns “those qualities of the human spirit – such as love and compassion, patience, tolerance, forgiveness, contentment, a sense of responsibility, a sense of harmony – which

ⁱ Unlike fostering, the verb “drive” is more active, more directive, indicating an onward movement or push forward.

bring happiness to both self and others” (Dalai Lama 1999: 22, quoted in Fry 2005). Moreover, these underlying values or inner qualities can be developed independent of any religious or metaphysical belief system (Dalai Lama 1999; Fry 2005).

Fry (2003) developed the spiritual leadership theory based on an intrinsic motivation model that combines vision, altruistic love, hope/faith, and theories of workplace spiritualityⁱ. Spiritual leadership is defined as “as comprising the values, attitudes, and behaviors that are necessary to intrinsically motivate one’s self and others so that they have a sense of spiritual survival through calling and membership” (Fry 2003: 694-695). The outcome is an increase in one’s sense of spiritual well-being achieved through calling and membership, i.e., “they experience meaning in their lives, have a sense of making a difference, and feel understood and appreciated” (Fry 2005: 836). The vision refers to a picture of the future and is created from the organization’s mission or reason for existence. The mission defines the company’s culture, core values, and the reason for being. Hope/faith is the source for the conviction that the organization’s vision/purpose/mission will be fulfilled. Having faith is demonstrated through action and is based on values, attitudes and behaviors, such as trust, belief, endurance, perseverance, and a willingness to do what it takes to do one’s personal best and maximize one’s potential (MacArthur 1998; Fry 2003). Altruistic love is defined as “a sense of wholeness, harmony, and well-being produced through care, concern, and appreciation for both self and others” (Fry 2003: 712).

Fry (2005) extended spiritual leadership theory by arguing that spiritual leadership is a source of ethical and spiritual well-being, as well as corporate social responsibility. He contends that “recent developments in workplace spirituality, character ethics, positive psychology, and spiritual leadership provide a consensus on the values, attitudes, and behaviors necessary for positive human health and well-being” (Fry 2005: 48).

ⁱ Workplace spirituality is defined as “a framework of organizational values evidenced in the culture that promotes employees’ experience of transcendence through the work process, facilitating their sense of being connected in a way that provides feelings of compassion and joy.” (Giacalone & Jurkiewicz 2003: 13, quoted in Fry 2005).

As shown in Figure 4.1ⁱ, Fry (2008) built on earlier work and offered a revised causal model of spiritual leadership where the source of spiritual leadership is an inner life. This revision is based on the findings of Duchon & Plowman (2005) that workplace spirituality is associated with the leader’s ability to enable the worker’s sense of meaningful work and community, and with the ability to personally incorporate and support the workers’ inner life. Inner life is considered as a fundamental source of inspiration and insight that positively influences the development of hope/faith in a transcendent vision of service to key stakeholders and the values of altruistic love. It includes “personal practices such as meditation, prayer, religious practices, yoga, journaling, walking in nature, and organizational contexts (e.g., rooms for inner silence and reflection) to help individuals be more self-aware and conscious from moment to moment and draw strength from their beliefs” (Fry et al. 2017: 24). Or, in other words, “inner life is an inward journey of self-discovery and awareness that leads one to the realization that true happiness is not found through self-serving values, attitudes, and behavior based on egoic needs, but rather found in becoming other-centered through hope/faith in a vision of service to others through love, which is the essence of spiritual leadership” Fry et al. (2017: 38).

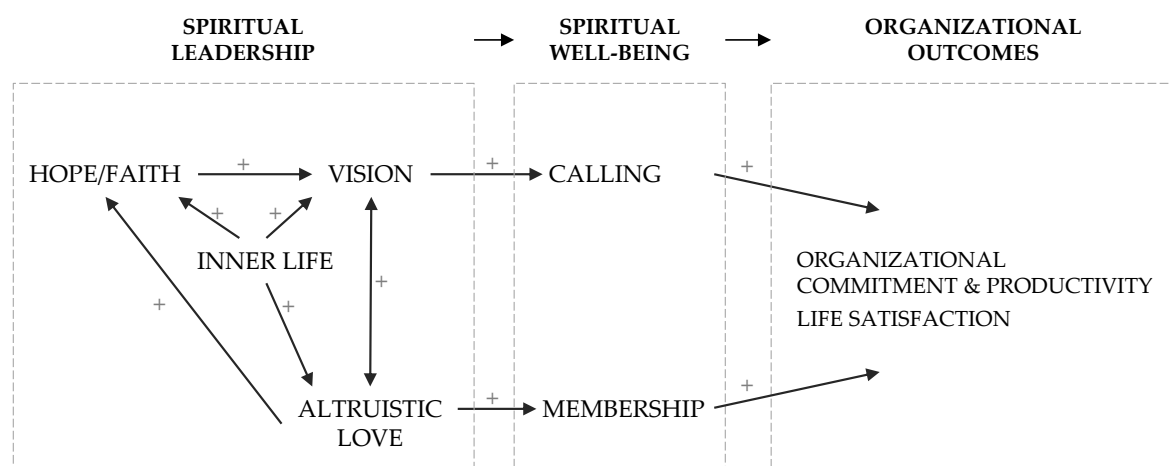


Figure 4.1 Spiritual leadership model (adapted from Fry 2008).

Meanwhile, spiritual leadership has been applied and tested in other fields, such as Islamic leadership development (Egel & Fry 2017), character development (Sweeney & Fry 2012),

ⁱ Organizational outcomes here consist of organizational commitment and productivity, employee life satisfaction, ethical and spiritual well-being, and corporate social responsibility. For a comprehensive overview, see for example Fry & Matherly 2006, Fry & Slocum 2008, Fry et al. 2005.

organizational values creation (Ferguson & Milliman 2008), impact on organizational citizenship behavior (Hunsaker 2016; Chen & Yang 2011).

4.2 Revised spiritual leadership theory

Before revising the theory of spiritual leadership, it is important to note that this study makes the assumption that the nature of those spiritual leadership variables is rhythmic. This is in line with the work of Kelly & Barsade (2001) and Waller (1999) on behavioral entrainment; of Goss (2007) on emotional entrainment; and of Hinds & Bailey (2003) on shared context as coordination mechanism, discussed in the thematic review in chapter 2.

Applying the refined entrainment lens, presented in the previous chapter, this study proposes four revisions to the theory of spiritual leadership. First, it proposes that there should be a *coherent* interaction between the spiritual leadership variables (vision, altruistic love and hope/faith) for spiritual leadership to occur, as opposed to the causal model suggested by Fry (2003). It is based on the learnings from intraentrainment in physiology that increased coherence enhances its working within itself and with other rhythms; coherence is defined as the degree of entrainment across the rhythms (cf. 3.2.1). This implies that lower levels of vision, altruistic love and hope/faith are also able to foster spiritual leadership on the condition that these levels are coherent, i.e., the variance is minimal (Figure 4.2). For example, if the company's values are not in line with the organization's vision, coherent interaction between altruistic love and vision is not possible. Similarly, if the work is done through hope/faith but not in line with the company's vision, or the work is done with a different set of company values, then coherent interaction between hope/faith and vision or altruistic love is not possible. As a consequence, changes in one of the variables should be followed by changes in the other variables to foster entrainment and coherent interaction. The proposition can be written as follows:

Proposition 1: Spiritual leadership occurs through a coherent interaction among its consisting variables – vision, altruistic love, and hope/faith – at every moment in time.

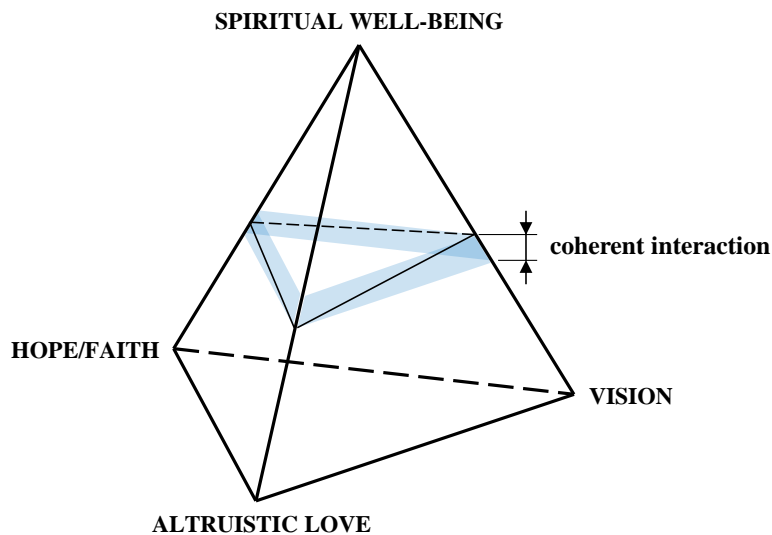


Figure 4.2 Coherent interaction among spiritual leadership variables.

Next, following Ancona & Chong (1996), entrainment can occur between individual subsystems and some aspects of the external environment, as well as between an entrained system and some aspect of the external environment. Applying these principles to spiritual leadership, each variable of spiritual leadership, whether it is entrained to other variables or not, can be entrained to some aspect of the external environment. Schein (1985) argues that entrainment between the founder and its environment at the time of foundation creates a rhythm inside the organization that remains the strongest in its history. Regardless of the situation, an organization with a high degree of entrainment will develop itself according to its vision (intraentrainment) in connection with other organizations (interentrainment), and according to its environment (asymmetrical entrainment). This second revision leads to the following proposition.

Proposition 2: At every level, spiritual leadership and its consisting variables (vision, altruistic love, hope/faith) are entrained by some aspects of the external environment.

The third revision looks at the influence of inner life on the process of entrainment. Fry (2008) argued that the source of spiritual leadership is an inner life which positively influences the development of the variables, but he could not define the characteristics of an effective inner life practice. Levi (2003) identified key enablers of interpersonal entrainment that could give some insights into the effectiveness of such practices. The most widely shared enabler for interpersonal entrainment was an acknowledged feeling of

vulnerability, expressed by study participants as a sense of not knowing, self-revelation, openness to learning and growth. Another widely shared factor was silence to connect with oneself, one another and the environment. According to Tiller, McCraty & Atkinson (1996), meditative centered states are known to produce strong entrainment. Truth-telling (i.e., speak with your own voice about your own truth) was another enabler. As a result, this revision can be written as followings:

Proposition 3: An effective inner life positively influences the entrainment process of spiritual leadership and its consisting variables.

The fourth revision concerns the outcome of spiritual leadership: spiritual well-being. It is the experience of meaning in life, and the feeling of being understood and appreciated; it is not obtained by striving for it directly (Fry 2005). It emerges out of the interaction between altruistic love, vision and hope/faith, and with its environment, fueled by an inner life (Fry 2008). Hence, spiritual well-being has emergent properties, i.e., properties that cannot be reduced to the properties of the parts, similar to the rhythm, melody, and harmony between the individual notes that make up a piece of music.

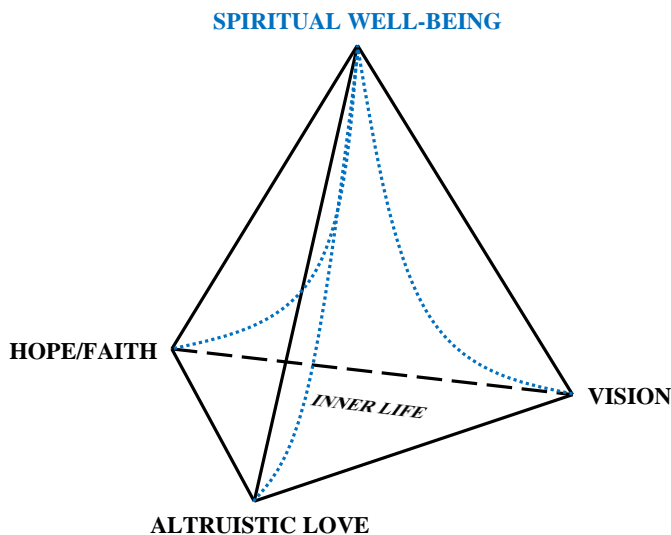


Figure 4.3 Emergent resonant outcome of spiritual leadership.

Spiritual well-being is the resonant outcome (Figure 4.3) when there is coherence among all variables at the same time and throughout the different levels (e.g., self – team – organization). This leads to the fourth proposition:

Proposition 4: Spiritual well-being is the resonant outcome emerging out of a coherent interaction among all variables of spiritual leadership and the environment.

4.3 Driving organizational intrainment

As discussed in the previous chapter (cf. 3.2.1), the human heart has five distinct characteristics:

1. It is autonomous and does not need any external stimulus (e.g., McCraty, Tiller & Atkinson 1996; Childre & Martin 1999).
2. A healthy heart is fractal, which entails that the structure remains the same at each level (cf. self-similarity; Goldberger et al. 2002).
3. Elevated emotions – such as appreciation, care, nonjudgment – enhances its working (Childre & Martin 1999).
4. A healthy working heart pulls other human systems into intrainment (e.g., McCraty, Tiller & Atkinson 1996; Childre & Martin 1999).
5. Such intrainment in the human body increases the internal coherence and positively influences cognitive performance, sensitivity, mental clarity, emotional stability and well-being (McCraty & Atkinson 2003; Childre & Cryer 2000).

This study posits that the model of spiritual leadership is able to drive organizational intrainment and corresponds to these heart characteristics for the following reasons. First, the intrinsic motivation cycle, on which the spiritual leadership theory is based, can be compared with the autonomous heart rhythm or the heartbeat of an organization. It is defined as an interest in or an enjoyment of a task for its own sake, evolving within the individual from active engagement rather than from an external influence (Ryan & Deci 2000; Fry 2003).

Second, the model of spiritual leadership can be applied at the individual, group, and any other organizational level. In other words, it is fractal. In other words, spiritual leadership

holds on every level and depends on a coherent interaction between its variables, hence, spiritual leadership itself can be considered autonomous on each level.

Third, the model of spiritual leadership is positively influenced by an effective inner life (such as meditation, yoga, journaling), as discussed earlier. Altruistic love is key for creating an organizational culture whereby people have a sense of membership, feel understood and appreciated. It is produced through care, concern, and appreciation for both self and others (Fry 2003). Similar to driving the entrainment process in the human system (Childre & Martin 1999), care and appreciation also drive the entrainment process of spiritual leadership.

Fourth, the purpose of spiritual leadership is to create value congruence and build effective relationships across all individual and group levels within an organization (Fry 2003)ⁱ. This can be considered as driving entrainment across all organizational levels, pulling other systems into entrainment. Hope/faith is defined as the source of self-motivation for doing the work, demonstrated through action; hope is a desire with expectation of fulfillment, while faith adds certainty to hope (Fry 2003). Furthermore, the mission of an organization defines its culture, core values, and the reason for being (Fry 2003). Having the right mission is an essential element to define the right values necessary for entrainment. Similar to spiritual leadership, Childre & Martin (1999: 104) posit that a sincere desire drives coherence in a human system: "Sincerity motivates our heart and aligns our true intentions".

Finally, studies have shown that intrinsic motivation is also associated with better performance, learning, and well-being (Benware & Deci 1984; Deci & Ryan 1985; Valas & Slovik 1993) and it is manifested through autonomy, competence and relatedness (Ryan & Deci 2000). Spiritual well-being is the emergent outcome of spiritual leadership (Fry 2005, 2008). This is also true from an entrainment point of view at the individual physiological level (cf. 3.2.1 Intraentrainment). Increased coherence enhances people's

ⁱ The variables of Spiritual Leadership are measured using survey questions especially developed for this theory. These questions were initially constructed to assess spiritual leadership at the group level. Each group consists of a leader and group members. Throughout an organization, several groups can be identified for such assessment. For example, chairman and board of directors, CEO and management team, managers and team leaders, team leaders and corresponding team members. Meanwhile, survey questions were adapted to assess spiritual leadership at the individual level too. For more details and application of the theory in practice, see chapters 5 and 6.

cognitive performance, sensitivity, and mental clarity as well as increased emotional stability and well-being (McCraty & Atkinson 2003; Childre & Cryer 2000). It is regarded as a fast, intuitive source of wisdom and clear perception, an intelligence that embraces and fosters both mental and emotional intelligence (Lacey & Lacey 1970; Frysinger & Harper 1990; McCraty, Tiller & Atkinson 1996; Childre & Martin 1999). This coherence in human beings is assessed through HRV (heart rate variability). Moreover, a study examining HRV coherence levels in groups found that being in such an (individual) HRV coherent state helped others to shift into a more coherent state as well (Morris 2010). Based on these findings, the following proposition is made:

Proposition 5: HRV coherence is an indicator of spiritual leadership. Individual HRV coherence is related to personal spiritual leadership, while group HRV coherence is related to the group's spiritual leadership.

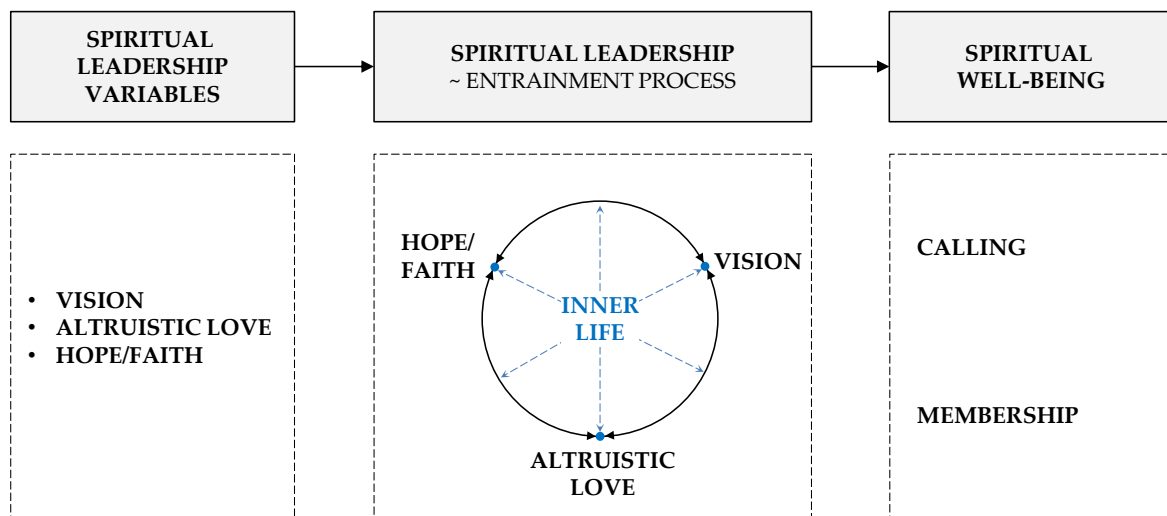


Figure 4.4 Entrainment mediating spiritual leadership and spiritual well-being.

To summarize (Figure 4.4), from an entrainment perspective, spiritual leadership is the coherent interaction among its variables vision, altruistic love and hope/faith. If these variables are carefully worked out in an organization (i.e., coherent to each other), it can drive the entrainment process between these variables and the external environment. This entails that they interact with each other in such a way that they adjust towards and eventually lock-in to a common phase and/or periodicity (cf. Blueborn 2002). In addition,

an effective inner life positively influences each variable and this process of entrainment among them. The outcome of this process is spiritual well-being, through calling and membership. In other words, spiritual leadership relates positively with entrainment. The relationship between the spiritual leadership variables and spiritual well-being is mediated by entrainment.

4.4 Conclusion, limitations and future research

This study argues that applying the revised theory of spiritual leadership throughout every level of the organization can drive organizational intraentrainment. Doing so, it makes five propositions. First, there should be a coherent interaction between the vision, altruistic love and hope/faith for spiritual leadership to occur. This entails that changes in one of the variables should be followed by changes in the other variables to be coherent. As a result, lower levels of shared vision, altruistic love and hope/faith are also able to foster spiritual leadership when coherent. Second, based on the work of Ancona & Chong (1996), spiritual leadership and its consisting variables are entrained by some aspects of the external environment. Next, this study proposes that an inner life also enhances the interaction among these spiritual leadership variables. It is not only considered as a fundamental source for the development of hope/faith, vision and altruistic love (Fry 2008). Furthermore, out of this coherent interaction emerges spiritual well-being. Hence, it possesses emergent properties. Finally, this research contends that personal spiritual leadership, or intraentrainment at the individual level, is able to enhance organizational intraentrainment. In other words, an individual in a coherent state can help others to shift into a more coherent state as well. Within individuals, it is suggested that such a state is reflected through a coherent heart rate variability. A state of being in sync with the people around has been described as resonant leadership by Goleman, Boyatzis, and McKee (Goleman et al. 2002; Boyatzis & McKee 2005). More recently, Boyatzis and colleagues proposed a model for developing resonant leaders through emotional intelligence, vision, and coaching (Boyatzis, Smith, Van Oosten & Woolford 2013).

In terms of theoretical relevance, this study makes a contribution by applying the refined entrainment lens to the model of spiritual leadership, which has changed the understanding of the relation between the variables of that model. As such, using a leadership construct to foster entrainment, it fills a gap in the literature of entrainment in

organizations and laid down a basis for new empirical research in the fields of spiritual leadership and organizational entrainment. The propositions put forward can help shaping future research as well. In terms of practical relevance, this study argues that a coherent relationship among the spiritual leadership variables, instead of a causal one, is able to drive organizational intraentrainment. This implies that practitioners are invited to focus managerial attention on how coherent the variables are in practice. For example, is the fulfillment of an organization's vision demonstrated through appropriate action and within corresponding care and appreciation for both self and others? In addition, it highlights the impact of their own (personal) spiritual leadership on organizational intraentrainment.

However, the study presented in this chapter is subject to limitations. First, the research context is limited in scope, aiming to use a leadership construct to drive organizational entrainment. Furthermore, the leadership construct is selected based on motivation-based leadership theories with extensive research. Theories of authentic and servant leadership, for example, have not been considered. In addition, the deterministic variables used in the selected theory of spiritual leadership stem from a realistic ontology and positivist epistemology. Adopting a different ontological and epistemological lens could determine other variables and identify other theories within the same context. Therefore, the proposed model to drive organizational intraentrainment is only one way among many others. Second, driving organizational intraentrainment through a single leadership construct represents a huge task given the complexity of the phenomenon. However, the purpose of this study was to fill a gap in the entrainment literature using a leadership construct, as well as highlighting intraentrainment in organizations. Third, spiritual leadership is built on an intrinsic motivation model (Fry 2003). More recent motivation models have not been considered, such as family motivation, which is an important source of motivation, especially when intrinsic motivation is absent, according to Menges et al. (2017).

Several avenues for further research have been identified. Fry (2008) argues that more longitudinal studies are needed to test the validity of the spiritual leadership model over time. As explained in this study, the entrainment lens emphasizes the existence of many other variables that could contribute to such a validity test. Next, longitudinal and multi-level studies could contribute to determine the impact of the key variables on coherence and to define a coherent interaction. Other research could investigate the relationship

between team outcomes and HRV coherence of a team, using heart rate sensors of the latest generation for example. Research to rank the effectiveness of inner life practices by measuring the impact on HRV would provide a new perspective on those practices, from which organizations could choose.

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Evaluating the conditions for entrainment through spiritual leadership

This chapter is based on an article presented at the 2nd International QCA Summer Workshops 2019, Antwerp Management School, Belgium.

Building further on the propositions discussed in the previous chapter, this study evaluates the conditions for entrainment at the individual and group level, through which spiritual well-being emerges, by addressing the variance among spiritual leadership variables (i.e., coherent interaction) and inner life measures. In other words, does inner life moderate the coherent interaction among the spiritual leadership variables? Can heart coherence be considered as an indicator of spiritual leadership? This study employs a multilevel, quantitative, within-subjects, pre-test and post-test longitudinal design in a convenience sample of 11 participants from two study groups with age range 50-66 ($M=55.4$, $SD=4.6$) years. Participants were selected on a voluntary basis at the beginning of a craniosacral therapy training.

The study in chapter 4 suggests that the model of spiritual leadership is a leadership construct that is capable of driving intraentrainment in organizations. It further argues that personal spiritual leadership and having an effective inner life positively influences interpersonal entrainment, which is reflected through a coherent heart rate variability (HRV) within human beings, but also organizational intraentrainment. Before going into the methodology and results, the underlying theory is briefly described, including the measuring of heart rate variability. In the subsequent section, the fuzzy set qualitative comparative analysis approach (fsQCA) is explained that is used to calibrate and evaluate the conditions for entrainment. Finally, this study concludes with a summary of the main findings, limitations and future research directions.

5.1 Theory

5.1.1 Hypotheses being studied

The research described in chapter 4 posits that entrainment mediates the relationship between spiritual leadership variables and its emergent outcome, spiritual well-being, while an inner life moderates the relationship between spiritual leadership and entrainment. Moreover, spiritual leadership occurs through a coherent interaction between the shared vision, altruistic love, hope/faith, and its environment (i.e., the variance is minimal; Figure 4.2), and that an effective inner life positively influences the entrainment process towards a higher degree of coherence.

Furthermore, HRV coherence is considered as an indicator of spiritual leadership. Individual HRV coherence is related to personal spiritual leadership (PSL), while group HRV coherence is related to the group's spiritual leadership (GSL). The study further argues that personal spiritual leadership and having an effective inner life positively influence for the emergence of higher levels of interpersonal entrainment, which is reflected through a coherent heart rate variability (HRV) within human beings. This implies that an individual in a coherent state can help others to shift into a more coherent state as well. Studies of Morris (2010), McCraty & Childre (2010), Childre & Cryer (2000), amongst others, have shown that such higher HRV coherence enhances people's cognitive performance, sensitivity, and mental clarity as well as increased emotional stability and well-being. It is seen as a source of wisdom that fosters mental and emotional intelligence (Lacey & Lacey 1970; Frysinger & Harper 1990; McCraty et al. 1996; Childre & Martin 1999).

These propositions, broadly discussed in chapter 4 of this dissertation, lead to the following hypotheses researched in this study (Figure 5.1):

- H1. At the individual level: Inner life (P3) moderates the coherent interaction (P1) among the spiritual leadership variables (vision, hope/faith, altruistic love), which mediates the level of spiritual well-being (P4).
- H2. At the group level: Spiritual well-being of each group member together (P3) moderates the coherent interaction (P1) among the spiritual leadership variables (vision, hope/faith, altruistic love) of the group, which mediates the level of spiritual well-being of the group (P4).

H3. HRV coherence (HC) is an indicator of spiritual leadership, through which spiritual well-being emerges.

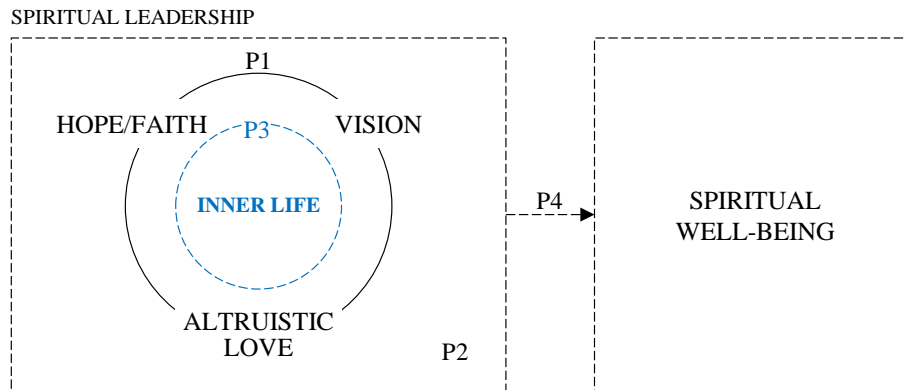


Figure 5.1 Hypotheses being studied.

5.1.2 Heart rate variability

Heart rate variability (HRV) is the variation of the time intervals between two consecutive heartbeats and reflects the regulation of several physiological systems in the human body, such as cardiovascular, central nervous, endocrine, and respiratory system. An optimal level of HRV implies a healthy functioning and an inherent self-regulatory capacity, adaptability, or resilience (Shaffer & Ginsberg 2017; McCraty & Shaffer 2015).

The heart rate (HR) itself is regulated by both the sympathetic and parasympathetic branches of the autonomic nervous system (ANS). The activity of the sympathetic nervous system (SNS) increases HR and decreases HRV, while that of the parasympathetic nervous system (PNS) does the opposite, decreases HR and increases HRV (Berntson et al. 1997). HRV can be assessed with several analytical approaches, both linear and non-linear. This study focuses on the linear time-domain and frequency-domain measurements because non-linear measurements are primarily used for examining the unpredictability of a time series (Stein & Reddy 2005). Table 5.1 gives an overview of frequently used HRV linear measures. The term *power* is “the signal energy found within a frequency band” (Shaffer & Ginsberg 2017: 2).

SDNN and RMSSD are time-domain metrics. SDNN is more accurate when calculated for periods over 24h (Task Force et al. 1996), than for shorter sessions in which RMSSD is a

more reliable metric (Shaffer & Ginsberg 2017). The RMSSD also reflects one's ability to self-regulate (Shaffer et al. 2014).

Table 5.1 HRV linear measures.

Parameter	Domain	Unit	Description
SDNN	time	Ms	Standard deviation of NN (interbeat) intervals ¹
RMSSD	time	Ms	Root mean square of successive RR interval differences ¹
ULF (power)	frequency	ms ²	Absolute power of the ultra-low-frequency band (≤ 0.0033) ¹
VLF (power)	frequency	ms ²	Absolute power of the very-low-frequency band (0.0033–0.04 Hz) ¹
LF (power)	frequency	ms ²	Absolute power of the low-frequency band (0.04–0.15 Hz) ¹
HF (power)	frequency	ms ²	Absolute power of the high-frequency band (0.15–0.4 Hz) ¹
LF/HF	frequency	%	Ratio of LF-to-HF power ¹
HC	frequency		Heart coherence ²
HC2	frequency	%	Approximate HC measurement: LF-to-(VLF+HF) power ²

¹ Shaffer & Ginsberg 2017

² McCraty & Shaffer 2015

In the frequency domain, the electrocardiogram (ECG) is transformed into its components ULV (ultra-low), VLF (very low), LF (low) and HF (high) frequencies, each operating within a different frequency range (see Table 5.1). These metrics may also be expressed as the natural logarithm (Ln) of the original units to achieve a more normal distribution of the data (Keene 1995). Table 5.2 gives an overview of short-term HRV metrics (in absolute values).

Table 5.2 Short-term HRV data (Nunan et al. 2017).

HRV metric	Mean (SD)	Range	Studies
IBI (ms)	926 (90)	785 - 1 160	30
SDNN (ms)	50 (16)	32 - 93	27
RMSSD (ms)	42 (15)	19 - 75	15
LF (ms ²)	519 (291)	193 - 1 009	35
HF (ms ²)	657 (777)	83 - 3 630	36
LF/HF (ms ²)	2.8 (2.6)	1.1 - 11.6	25

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An essential metric for this study is the Heart Coherence (HC), introduced by McCraty and colleagues for describing the amount of harmony, stability and order in the various physiological rhythmic activities present in living systems during a specific period (Tiller et al. 1996). “A harmonious order signifies a coherent system that has an efficient or optimal function directly related to the ease and flow in life processes” (McCraty & Shaffer 2015: 55). It is assessed “by identifying the maximum peak in the 0.04–0.26 Hz range of the HRV power spectrum, calculating the integral in a window 0.030 Hz wide, centered on the highest peak in that region, and then calculating the total power of the entire spectrum. The coherence ratio is formulated as: $(\text{Peak Power} / [\text{Total Power} - \text{Peak Power}])$ ” (McCraty & Shaffer 2015: 55). An approximate measurement for HC is the ratio $\text{LF} / (\text{VLF} + \text{HF})$ (Tiller et al. 1996; McCraty & Childre 2010). Kim et al. (2014) found a positive correlation between a similar proxy of $\text{MF} / \text{LF} + \text{HF}$ and the accumulated coherence score (i.e., a score representing the length of a coherent state attained by a subject). In their study, the frequency bands were defined differently (LF: 0.01-0.08 Hz; MF: 0.08-0.15 HZ; HF: 0.15-0.5 Hz).

Based on the complex nature of HRV, Quintana & Heathers (2014) recommend researchers the use of within-subjects designs along with the establishment of a suitable baseline and monitoring respiration.

5.2 Methods

5.2.1 Study design and participation

This study requires the following: the forming of a new team; working closely together during a distinct period of time; where HRV capturing is possible and under best circumstances (see 5.2.7 for more details); and where entrainment is fostered and not obstructed. Therefore, a training in CranioSacal Therapy was selected. However, different training sessions or activities might be suitable for the same objective (see future research in 5.4)

This study has a within-subjects design, as recommended by Quintana & Heathers (2014). Participants were not selected or recruited beforehand, but an opportunity to participate in this study was given to all students at the beginning of the craniosacral therapy training

modules *Talking to the Heart* (24-27 May 2018) and *Know Your Brain - level 3* (15-18 Nov 2018) of the accredited Peirsman CranioSacraal Academie (Bussum, The Netherlands). The latter is an advanced course for graduates only. A brief explanation of the study was given, including procedure and wearing of a heart sensor during the whole training.

In total, 11 students (all female) volunteered to take part in this study with age range 50-66 (M=55.4, SD=4.6) years. The participation rate was respectively 55% and 33%. There were no inclusion or exclusion criteria, nor were there any benefits of participating in this study. Each student was given the chance to participate. Table 5.3 gives a detailed overview.

Table 5.3 Study participation.

	I	II	Total
Participants (all female)	6	5	11
Age (y)	51-56	50-66	50-66
Average age (y)	53.1	58.3	55.4
SD (y)	1.5	5.4	4.6
Cranio practice (y)	1.5	11.0	5.8
Meditation practice (y)	17.1	5.1	12.3
Yoga practice (y)	26.4	5.7	18.6

I: Module *Talking to the Heart*

II: Module *Know Your Brain - level 3*

5.2.2 Ethics

Ethical approval was waived by the Medical Ethics Committee of the University of Antwerp and from the Dutch Central Committee on Human Research (CCMO; 14 May 2018). This study focuses on variables in spiritual leadership theory, hence, outside the scope of the definition of a *medical experiment* as provided by the Belgian law and outside the scope of the *Medical Scientific Research Act with people* in The Netherlands, also referred to as *WMO* or *Wet Medisch-Wetenschappelijk Onderzoek met mensen*. All participants were given information about the research, including the guarantee of confidentiality, the right to withdraw from this research at any stage, and the right to see their data being collected throughout the research process. Each participant provided written consent regarding the use of their information.

5.2.3 Craniosacral therapy

Craniosacral therapy (CST), a term coined by research professor John Upledger in the 1980s at the Michigan State University, originates from cranial osteopathy and works with the craniosacral system. This is a coherent physiological system including the meningeal membranes within the skull and spine, the bones to which these membranes adhere and the cerebrospinal fluid. This fluid circulates and pulses continuously through these membranes, about 10 cycles per minute, between the skull (cranium) and the sacrum, also called the craniosacral rhythm (Upledger & Vredevoogd 1983; Upledger 1995). Craniosacral therapy is a complementary treatment approach where CS therapists first palpate this rhythm for pace, amplitude, symmetry, and quality to identify where restrictions may exist, and then they apply sensitive methods for releasing them (Upledger & Vredevoogd 1983; Upledger 2002). The results of a systematic review of Jäkel & von Hauenschild (2012) highlight the improvement of pain and general well-being by the use of CST, while more recently, Kratz et al. (2017) found that it benefits Autism Spectrum Disorders. In this study, it is assumed that craniosacral therapy induces entrainment.

5.2.4 Apparatus and HRV data extraction

ElectroCardioGraphic (ECG) signals are continuously monitored with the CE marked and FDA approved ePatch ECG monitor, specially designed to limit wearing discomfort and impairment of normal daily life activities (Saadi et al. 2014). It consists of a single-use adhesive ePatch electrode placed on the chest of the participant and a reusable ePatch sensor. Unlike regular telemetry equipment, this system design is less intrusive, and as a result, can be deployed in large-scale screening programs to monitor new populations of people wearing such a system.

Data recording starts automatically after mounting the system and is stored in a proprietary ePatch File System format. After removal from the chest, the raw sensor data was retrieved. The raw data was extracted by IMEC, a Belgian non-profit R&D organization specialized in nanoelectronics and digital technologies. A quality assessment of the ECG signal was performed using the quality indicators from Orphanidou et al. (2014). The HRV variables were calculated within a 10 min window with no overlap.

5.2.5 Measures

Spiritual leadership and spiritual well-being. The level of personal spiritual leadership and well-being were assessed using the Personal Spiritual Leadership Survey (Rev 4/2018). Included questions are “I have the courage to stand up for what I believe in.”; “I have a personal vision that is clear and compelling to me.”; “I always do my best because I have faith in myself.” To assess the level of spiritual leadership and well-being in the group, participants were asked to fill in the revised Spiritual Leadership Survey (Rev 1/2018). Example questions are “My class’s purpose inspires my best performance.”; “I set challenging goals for my work because I have faith in my classmates and want us to succeed.”; “The members in my class are honest and without false pride.”

Inner life. The Mindful Attention Awareness Scale (MAAS; Brown & Ryan 2003) was used at the start of the study to measure levels of dispositional mindfulness. It is a single factor scale which uses 15 items rated from one (“almost always”) to six (“almost never”). Higher mean scores indicate greater dispositional mindfulness. Included questions are “I find myself doing things without paying attention.”, “I rush through activities without being really attentive to them.” Studies provided evidence that “MAAS not only predicts well-being outcomes but also has value in the study of the temporal and situational dynamics of self-regulated behavior and well-being.” (Brown & Ryan 2003: 843) The findings of MacKillop & Anderson (2007) largely support the validity of the MAAS and its measure is not related to gender. Hence, in this study, the MAAS score is considered as an adequate indicator for the level of inner life.

Heart rate variability. Although HRV was recorded continuously, only the measurements during a treatment session are taken into account to control for respiration and physical movement (Quintana & Heathers 2014). (See section 5.1.2 for a more detailed description of HRV.) From those measurements, the heart coherence (HC and HC2; see Table 5.1) is calculated and taken into account.

5.2.6 Procedure

After signing up for this study, participants were asked to fill in the first questionnaire (i.e., personal spiritual leadership and inner life) and to wear the heart sensor during the whole duration of the training. A qualified person mounted the sensor on each participant. No

further instructions were given, nor were any needed. Training could proceed as normal. At the end of the module, participants were asked to fill in the second questionnaire about team spiritual leadership and to remove the heart sensor.

A craniosacral therapy training module typically consists of a combination of theory and practice, where students give and receive a treatment session. Students are encouraged to work with different students. This multi-therapist approach is beneficial for a higher generalizability of the therapeutic (entrainment) effect, and not to assess the therapist effect. The whole training was voice recorded for analysis purposes only (see 5.2.7 for more detail).

5.2.7 HRV analysis

Quintana & Heathers (2014) presented recommendations for HRV assessment highlighting the influence of respiration and external factors on HRV, such as time of day, physical activity, caffeine, levels of alcohol and age. For respiration, they note that “Denver et al. (2007: 2) have argued against the need to control for respiration for resting state recordings, given the important influence of breathing on HRV.”

To limit the influence of those factors, only a subset of the data was used to assess HRV, based on the following controls:

- Data is filtered on signal quality (≥ 0.8) and physical movement (≤ 0.40), recommended by IMEC, based on experience with other studies (not published).
- Only data during treatment sessions were taken into account to control for respiration and physical movement. This implies that for each day, those sessions were identified using the voice recordings.

RStudio (Version 1.1.463) was used to apply these filters to the data and to calculate means with standard deviation. Statistical tests were run using JMP Pro 14.0.0.

5.2.8 Fuzzy set QCA approach

Qualitative comparative analysis (QCA) techniques allow a systematic comparison of cases, with the use of formal tools and theoretical foundations or conception of cases (Ragin

2000, 2008). It is built on the exploration of set-theoretical relationships between causally relevant conditions and its outcome (Schneider & Wagemann 2009). There are several reasons why this approach is suitable to analyze the research question in this study. First, each case is seen as a complex combination of properties and, as such, integrates a holistic perspective (Rihoux & Ragin 2009). The small number of cases would render insufficiently reliable results using regression analysis. QCA, on the other hand, was developed primarily for small-to-medium N approach. “It can be said that QCA techniques strive to meet advantages of both the ‘qualitative’ (case-oriented) and ‘quantitative’ (variable-oriented) techniques.” (Rihoux & Ragin 2009: 6). Next, QCA makes it possible to have a rich discourse with theory (Ragin 2000, 2008). Furthermore, the use of a formal Boolean language facilitates this discourse and can be applied at several levels of analysis at the same time (Rihoux & Ragin 2009). Finally, QCA does not ask to specify a particular causal model but leaves room for complexity to determine causal models that exist among the cases being compared (Ragin 1987).

The hypotheses put forward in this study (see section 5.1.1) can be translated in Boolean terms where two causes are jointly sufficient (i.e., IL : Inner Life, and CI : Coherent Interaction) to foster entrainment among the spiritual leadership variables through which spiritual well-being (SWB : Spiritual Well-Being) emerges. Heart Coherence (HC) is an indicator for this degree of entrainment.

At the individual level:

$$IL \times CI \rightarrow SWB_{ind} \sim HC_{ind}$$

At the group level:

$$\frac{\sum_i^n (IL \times CI)_i}{n} \rightarrow SWB_{grp} \sim HC_{grp}$$

For this study, the fuzzy set QCA (fsQCA) approach is used to evaluate the conditions for entrainment. This implies that data are calibrated in fuzzy set membership scores between 0 and 1 according to the degree of presence of the condition in a specific case. This study

ⁱ Note that coherent interaction (CI) and spiritual well-being (SWB) are measured using the Spiritual Leadership Survey at the group level. At the individual level, the Personal Spiritual Leadership Survey is used. See section 5.2.5 Measures for more details.

opted for a continuous fuzzy set scale, as shown in Table 5.4, where interval-scale variables are converted into fuzzy set values, using packages QCA v3.4 and SetMethods v2.4 (Oana & Schneider 2018) within RStudio v1.1.463. Unlike standard interval measures, fuzzy sets assign a quality to the variation. Membership has to be “purposefully calibrated” (Ragin 2008: 30).

Table 5.4 Continuous fuzzy set scale.

1	Fully in <i>More “in” than “out”</i>
0.50	Cross-over: neither in nor out <i>More “out” than “in”</i>
0	Fully out

Ragin (2008: 31)

In this study, it is suggested that the MAAS score is an indicator for the Inner Life variable. Brown & Ryan (2003) examined the MAAS scores among students of Zen meditation because one way of cultivating mindfulness is engaging in meditation. They found a significant difference between the Zen practitioner group (M = 4.29, SD = 0.66) and the comparison group (M = 3.97, SD = 0.64). Moreover, the scores within the Zen group correlates positively with the number of years of practice. To calibrate the MAAS score into fuzzy sets, values are assigned according to those break-points, as shown in Table 5.5.

As proposed in the previous chapter, spiritual leadership occurs through a coherent interaction between the shared vision, altruistic love, hope/faith, and its environment (i.e., the variance is minimal). Since this study was conducted in the same place, it assumes the same interaction of the environment with the two groups. Then, the coherent interaction can be expressed using the standard deviation of the spiritual leadership scores for each variable. To make the measure a coefficient, it is divided by the maximum score (=5). The coherent interaction (CI) is calculated as follows:

$$\text{Coherent Interaction} = \text{CI} = 1 - \frac{2\sigma}{5}$$

Spiritual well-being (SWB) is the outcome of spiritual leadership. Scores below 3 indicate the need for improvement, while scores above 4 indicate areas that are satisfactory (based on PSL Rev 4/2018). SWB and CI are calibrated using the break-points shown in Table 5.5.

Table 5.5 Fuzzy set construction.

<i>Variable</i>	<i>Code</i>	<i>Set construction break-points</i>
Inner Life	IL	Fully in: 4.29 Cross-over: 3.97 Fully out: 1.0
Coherent Interaction	CI	Fully in: 0.80 Cross-over: 0.60 Fully out: 0.0
Spiritual Well-Being	SWB	Fully in: 4.0 Cross-over: 3.0 Fully out: 1.0

5.3 Results

The measures of spiritual leadership are examined first – using the fsQCA approach – to evaluate the conditions for entrainment, through which spiritual well-being emerges, both at the individual and group level. Then, using HRV analysis, the conditions are explored under which heart coherence emerges, as an indicator for spiritual well-being.

5.3.1 Spiritual leadership

Table 5.6 gives an overview of the findings for each participant and group. Spiritual leadership (SL) is the average of the scores vision, hope/faith and altruistic love, for which the standard deviation (sdev) and coherent interaction (CI) are calculated. Inner Life (IL) is the MAAS score of each participant, and the average of the participants in the group. Spiritual well-being (SWB) is the average of the scores calling and membership (see also Figure 4.1 for an overview of the causal model of spiritual leadership).

Table 5.6 Results spiritual leadership measures.

	Group 1						Group 2					Grp1	Grp2
	1.1	1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3	2.4	2.5		
SL	3,00	3,67	3,33	3,67	3,11	4,00	5,00	4,56	4,44	4,67	4,11	3,73	4,40
<i>sdev</i>	0,87	0,87	0,71	0,50	0,33	0,50	0,00	0,53	0,53	0,50	0,33	0,62	0,66
IL	4,27	5,40	4,27	4,87	4,53	4,93	4,47	4,60	4,80	4,00	4,60	4,71	4,49
CI	0,65	0,65	0,72	0,80	0,87	0,80	1,00	0,79	0,79	0,80	0,87	0,75	0,74
SWB	3,67	4,67	3,67	3,83	3,50	4,33	5,00	4,50	3,83	4,50	4,17	4,23	4,63

SL: spiritual leadership; sdev: standard deviation; IL: inner life (MAAS); CI: coherent interaction; SWB: spiritual well-being

Remarkable are the high Inner Life (IL) scores. This might be explained by the long practice of meditation, yoga and cranio sacral therapy (see Table 5.3) of the participants. For example, the first group has on average 17 years of meditation practice and 26 years of yoga, with limited cranio practice (1.5 years). The second group, on the other hand, has more years of cranio practice (11 years) but less years of meditation and yoga practice (5 years), which might explain the slightly lower IL score (-5%).

The next step is to calibrate these findings in fuzzy sets, applying Table 5.5 to Table 5.6, resulting in the figures shown in Table 5.7 below. Two additional measures are particularly important for fuzzy set relationships: consistency and coverage. Consistency percentage evaluates the degree of support among the cases of a subset. Consistency is to set relationships as p-value is to statistical inference. The higher the consistency, the stronger the set-theoretical relationship. Rule of thumb is to look for relationships with consistencies greater than 90% (Ragin 2000). The coverage percentage, on the other hand, evaluates the proportion of the membership scores in an outcome that a particular configuration explains.

As shown in Table 5.7, the consistency of the set-relationship IL x CI is 90%, while coverage is 98%, across all cases (individual and group). The sufficient conditions IL and CI also have consistency scores higher than 80% indicating that these are sufficient for the outcome. In other words, there are cases where the relationship does not apply (i.e., cases 1.4 and 1.5; 2.3 and 2.5).

To summarize, using a fsQCA approach, this evidence examined herein supports the hypothesis (H1 and H2; section 5.1.1) that an inner life and coherent interaction can be usefully deployed in a consistent way to understand the emergence of spiritual well-being through entrainment, as proposed in the previous chapter. It shows that a high level of

spiritual well-being emerges with inner life levels ≥ 4.29 and with coherent interaction levels ≥ 0.8 , across the individual and group level.

Table 5.7 Fuzzy set spiritual leadership measures.

Case	preHC	IL_fs	CI_fs	ILxCI	SWB_fs
2.1	0,17	0,99	1,00	0,99	1,00
1.2	0,37	1,00	0,68	0,68	0,99
2.2	0,19	1,00	0,94	0,94	0,99
2.4	0,11	0,57	0,95	0,57	0,99
1.6	0,42	1,00	0,95	0,95	0,98
2.5	0,25	1,00	0,98	0,98	0,97
1.4	0,05	1,00	0,95	0,95	0,92
2.3	0,10	1,00	0,94	0,94	0,92
1.1	0,68	0,94	0,68	0,68	0,88
1.3	0,23	0,94	0,85	0,85	0,88
1.5	0,13	0,99	0,98	0,98	0,81
Grp1	0,31	1,00	0,90	0,90	0,97
Grp2	0,16	0,99	0,89	0,89	0,99
Consistency		97%	93%	90%	
Coverage		95%	98%	98%	

preHC: HeartCoherence (before start study; see 5.3.2 for more details)

IL: inner life; CI: coherent interaction; SWB: spiritual well-being

5.3.2 Heart coherence

In total, about 4 500 data points were collected in 10-minutes windows of ECGs recordings. For the first group, 440 data points were collected on average per participant, while 384 data points for the second group. After filtering for signal quality, physical movement, and treatment session (see 5.2.7 for more details), only 200 the data points were left for the first group (34 per participant on average) and 230 for the second group (47 per participant on average). Table 5.8 gives an overview of the frequency domain means (pre and post per group; during the first and last treatment session, i.e., ECGs recordings of more than 10 minutes). Frequency domain metrics are used to calculate heart coherence (HC and HC2; see also Table 5.1 for more details).

Table 5.8 Pre and Post means per group (frequency domain).

	Group 1				Group 2			
	Pre		Post		Pre		Post	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
HR (BPM)	69,1	9,7	76,2	9,8	73,8	13,1	65,5	16,2
LF (ms ²)	860	823	752	555	383	345	463	350
HF (ms ²)	419	499	421	536	327	462	482	443
LF/HF	4,55	5,40	3,44	2,77	1,75	1,15	1,11	0,48
HC	0,24	0,15	0,22	0,11	0,13	0,05	0,09	0,05
HC2	0,62	0,56	0,80	0,42	0,33	0,23	0,24	0,11
<i>Accelerometer</i>	0,01		0,01		0,02		0,01	
<i>Signal quality</i>	0,96		0,97		0,95		0,92	

Table 5.9 shows the heart coherence for each participant during the first 10min of the first recorded treatment session, and during the last 10 min of the last recorded treatment session. A repeated measure ANOVA on the pre and post means did not produce any significant difference for each group (Group 1: F test value: 0,2026; Prob>F: 0,36; Group 2: F value: 0,00; Prob>F: 0,97).

Table 5.9 Heart Coherence: Pre and Post results.

Group 1	HC		HC2	
	Pre	Post	Pre	Post
1.1	0,68	0,21	1,67	0,25
1.2	0,37	0,14	1,17	0,47
1.3	0,23	0,18	0,12	0,65
1.4	0,05	0,36	0,10	1,50
1.5	0,13	0,10	0,26	0,53
1.6	0,42	0,25	0,96	0,75
<i>mean</i>	0,31	0,21	0,72	0,69
<i>sdev</i>	0,23	0,09	0,65	0,43
Group 2	Pre	Post	Pre	Post
2.1	0,17	0,23	0,26	0,21
2.2	0,19	0,13	0,30	0,42
2.3	0,10	0,24	0,23	0,36
2.4	0,11	0,11	0,84	0,45
2.5	0,25	0,12	0,81	0,40
<i>mean</i>	0,16	0,17	0,49	0,37
<i>sdev</i>	0,06	0,06	0,31	0,09

Several reasons might explain this finding. First, calculating the heart coherence mean during a longer period averages out higher scores. Metrics in this study were calculated using a window of 10 min, as used by other studies (e.g., Field et al. 2018; McCraty et al. 2009). A window of one minute or shorter might show more accurate results. Instead of

averaging the metrics, one could also count the number of times a participant has entered into a coherent state level (e.g., Edwards 2016). Another reason for this insignificance may be found in the role of the participant (i.e., therapist or client), which has not been investigated in relation to heart coherence. To understand this relationship better, heart coherence is plotted during a treatment session, as shown in Figure 5.2. For this purpose, the longest recording of such a session is taken into account (i.e., day 3 from 14:30 until 15:30 UTC of group 2). It shows the seven consecutive data points per participant. Although no generalization can be made on these recordings, heart coherence varies in different ways per person, probably as a function of the participant's role (i.e., therapist or client). This was not taken into account in the current study design.

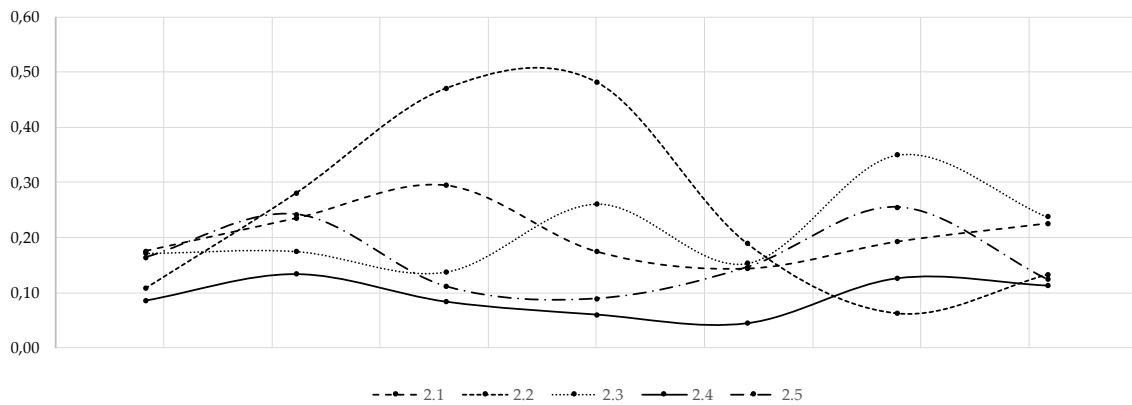


Figure 5.2 Heart coherence variation during 60' CST session (group).

To understand this therapist-client relationship better, an additional experiment was done with a client (with no previous experience with craniosacral therapy). Figure 5.3 shows the variation of heart coherence between therapist and client during a CST session (per 5 min window of ECGs recordings). Typically, a craniosacral therapist tune into the craniosacral rhythm for its quality (Upledger & Vredevoogd 1983; Upledger 2002), which might explain the fluctuations in heart coherence during the session, as shown in the figure. Moreover, every therapist has his own way of tuning in, and every session during the training is focusing on different parts of the body. All these elements might explain the high variation and lack of significant change in heart coherence during the whole training. Nevertheless, this study illustrates that HC does play a role in the process of entrainment (i.e., tuning into craniosacral rhythm), but further research is needed to understand its role.

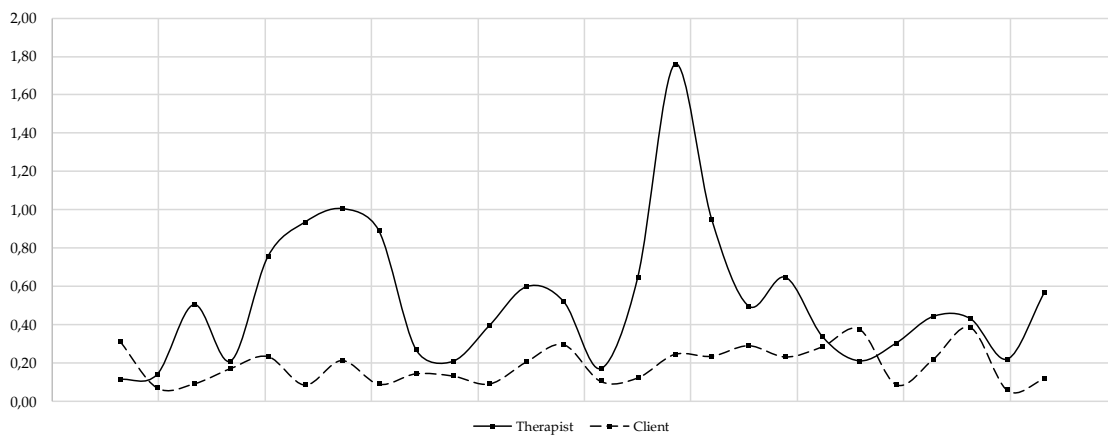


Figure 5.3 Heart coherence variation during CST session (therapist-client).

5.4 Conclusion, limitations and future research

This pilot study evaluates the conditions for entrainment at the individual and group level, under which spiritual well-being emerges, by addressing the variance among spiritual leadership measures, inner life, and heart rate variability (HRV) coherence. For this, it combines metrics from spiritual leadership and heart rate variability in a multilevel, quantitative, within-subjects, pre-test, and post-test design. The findings support the hypothesis (H1 and H2; section 5.1.1) that inner life and coherent interaction can be usefully deployed to understand the emergence of spiritual well-being through entrainment. Higher levels of spiritual well-being require a coherent interaction of > 0.8 . However, providing evidence for the hypothesis (H3) that HRV coherence is an indicator for the level of well-being was not possible with this study.

In terms of theoretical relevance, this study makes a contribution to the literature of spiritual leadership in several ways. First, it applies a fuzzy set QCA approach to spiritual leadership theory. A similar approach could be applied to existing data (of spiritual leadership theory) to test these and alternative conditions for the emergence of spiritual well-being and other outcomes. It also stimulates a different discourse by looking through the methodological lens of QCA. Next, it provides a definition of coherent interaction – not examined before in spiritual leadership theory – and an initial target level that can be challenged in future research. This study makes also a contribution to entrainment theory

at the individual level demonstrating that heart coherence does play a role in the entrainment process and most likely depends on the role the person fulfills (i.e., therapist or client). However, further research is needed to clarify this phenomenon in more detail by taking into account the role of each participant in a similar study. Other research could verify whether people with higher levels of heart coherence are able to tune into rhythms easier or not (i.e., speed and/or phase entrainment). Alternatively, research could capture the necessary data for a similar study during a different activity or training, e.g., residential team building.

This study makes some practical contributions. First, this study provides physiological indications that people do influence each other in various ways, without using words or expressive behavior, as shown in Figure 5.2, and most likely depends on the role they fulfill. Do individuals in leadership positions influence other people more than those not in leadership positions through this process of entrainment, could be a question for further research. Second, while the model of spiritual leadership has been used to transform organizations (e.g., Fry, Nisiewicz & Vitucci 2007; Fry, Nisiewicz, Vitucci & Cedillo 2007; Fry et al. 2005), this study gave an example how the concept of coherent interaction could be interpreted to foster entrainment, and, as a result, spiritual well-being. However, further research is needed – with or without organizational interventions – to test the usefulness of the model put forward.

The lack of experience with using heart sensors during a long recording period has limited this study in a number of ways. First, the HRV analysis shows that for certain participants the signal quality deteriorated the longer the sensor was worn. Future studies could pay more attention to the state of the skin before mounting the sensor to increase signal quality and adhesiveness of the patch (e.g., no skin lotion). Next, if data collection is not needed during the night, then it is highly recommended to use a new patch each day. Mounting of the sensor is easy and participants could do this for themselves in the following days. This approach will most likely increase participation rate as well (next to signal quality) if data collection is limited to working hours only. Although wearing the heart sensor is not uncomfortable, it does limit them in specific daily activities and hygiene routines.

Spiritual leadership theory has been extensively tested and validated in a variety of settings (e.g., Fry, Latham, Clinebell & Krahnke 2017; Fry & Matherly 2006; Fry, Vitucci & Cedillo 2005; Malone & Fry 2003). This study, however, uses the MAAS score (Mindful Attention

Awareness Scale; Brown & Ryan 2003) as an indicator for inner life because it is more extensive and its role in psychological well-being has been validated separately. As such, it combines two questionnaires that have not been validated together. Future research could validate this further. In addition, other questionnaires or theories could be considered to assess (the effectiveness of) inner life practice in future studies.

Like with every research, this study too is subject to limitations. First, the context in which this study was conducted is very specific and non-business-like. This most probably influences the quality and nature of the research findings. Second, sampling fewer than all the group members often lead to several errors, such as accepting false hypotheses (Allen et al. 2007; Timmerman 2005). Third, the limited number of cases in this study restricts the formulation of findings. Fuzzy set qualitative comparative analysis techniques were used based on two necessary conditions with spiritual well-being as outcome. A higher number of cases could not only enhance the richness of the findings, with or without using additional conditions that take into account other types of entrainment. For example, a condition related to the place (physical or geographical location), or a condition related to familiarity, which influences interpersonal entrainment. Harrison et al. (2003) demonstrate that a priori familiar teams have a positive impact on task performance. Thus, the findings should only be used for theoretical exploration.

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Evaluating intraentrainment at a professional services company

The study in chapter 4 posits that applying the model of spiritual leadership at the individual and group level within an organization can drive organizational intraentrainment and that entrainment mediates the relationship between spiritual leadership and its outcome, spiritual well-being. The empirical study in chapter 5 tests this proposition by evaluating the conditions for entrainment at the individual and group level, addressing the variance among spiritual leadership variables (i.e., coherent interaction) and inner life measures, in Boolean terms expressed as $IL \times CI \rightarrow SWB$. The findings of that study support that these conditions can be usefully deployed to understand the emergence of spiritual well-being. However, the limited number of cases within a professional training context confines generalization and deeper understanding. Therefore, the study in this chapter evaluates these same conditions at a professional services company, also at the individual and group level, using an explanatory sequential research design as mixed methods approach, integrating quantitative data from eighty-six participants across fourteen teams with qualitative data from five team leaders. The quantitative data are analyzed via a fuzzy set qualitative comparative analysis approach, similar to the one in the previous chapter.

In the context of a team-based professional services company, the following research questions are asked:

- Does inner life moderate the coherent interaction among the spiritual leadership variables (vision, hope/faith, altruistic love)?
- Does entrainment mediate the relationship between spiritual leadership and its outcome, spiritual well-being?
- How do teams and their team leaders differ on these variables?

6.1 Theory

This dissertation argues that applying the revised theory of spiritual leadership can drive organizational intraentrainment. The revision, presented in chapter 4, proposes two refinements. First, there should be a coherent interaction between the vision, altruistic love and hope/faith for spiritual leadership to occur. Second, an effective inner life also enhances the (quality of) interaction among these spiritual leadership variables, out of which spiritual well-being emerges. Here, inner life is not only considered as a fundamental source for the development of vision, altruistic love and hope/faith (Fry 2008). Spiritual well-being is the experience of meaning in life, and the feeling of being understood and appreciated (Fry 2005). The revised theory can be expressed in Boolean terms as: $IL \times CI \rightarrow SWB$, where Inner Life (IL) and Coherent Interaction (CI) are jointly sufficient to foster entrainment among the spiritual leadership variables through which spiritual well-being (SWB) emerges (cf. section 5.2.8).

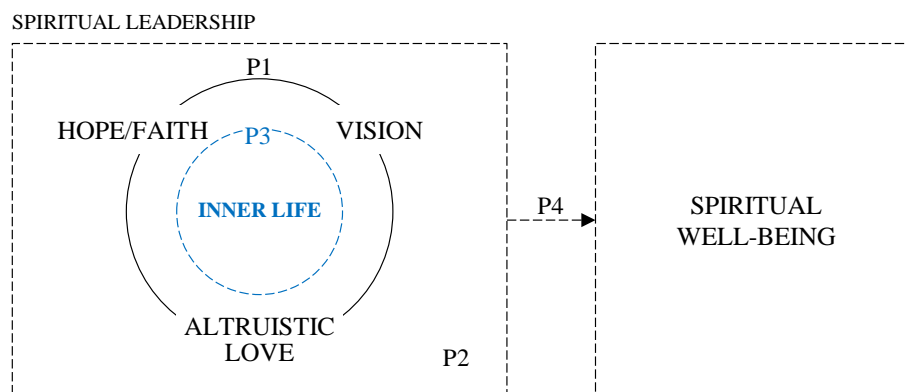


Figure 6.1 Hypotheses being studied.

The hypotheses researched in this study are the following (shown in Figure 6.1 and broadly discussed in chapter 4):

- H1. At the individual level: Inner life (P3) moderates the coherent interaction (P1) among the spiritual leadership variables (vision, hope/faith, altruistic love), which mediates the level of spiritual well-being (P4).

- H2. At the group level: Spiritual well-being of each group member together (P3) moderates the coherent interaction (P1) among the spiritual leadership variables (vision, hope/faith, altruistic love) of the group, which mediates the level of spiritual well-being of the group (P4).

6.2 Methods

6.2.1 Research design

This study adopts an explanatory sequential research design as mixed methods approach, integrating quantitative and qualitative data to yield a more comprehensive understanding of the results (Plano Clark & Ivankova 2016; Creswell 2005; Tashakkori & Teddlie 2003). In the first, quantitative phase of the study, the research question focuses on evaluating the the expression $IL \times CI \rightarrow SWB$ with data gathered through existing questionnaires, as described in section 6.3.1 Measures. In the second, qualitative phase, data is collected through face-to-face, single, semi-structured interviews to refine, explain or elaborate the findings of the quantitative phase in more detail.

Face-to-face interviews have a few advantages. First, they allow both participant and interviewer access to nonverbal data – such as gestures, facial expressions, and body movements – that are able to enrich the verbal data or spoken words (Hiller & DiLuzio 2004; Carr & Worth 2001). Next, when in the same room, they can build the rapport for disclosing their experiences more freely and effectively than in interviews conducted over the phone or internet (Shuy 2003). Finally, the strength of the interviewer-participant relationship determines the data being collected and the data validity (Know & Burkard 2009; Adler & Adler 2002; Kvale 1996; Polkinghorne 1994). However, the single interview approach opted in this study, typical in situations with difficult access to the participants (DiCicco-Bloom & Crabtree 2006), will limit the amount of data collected (Mishler 1986), as well as their meaning (Patton 1989). Therefore, the interviews follow a semi-structured protocol, using open-ended questions to obtain specific information about the variables of spiritual leadership and to enable comparison across cases. Nevertheless, they allow creativity and flexibility to engage particular areas in more depth that emerge from the interviewee (Hill et al. 2005; Hill, Thompson & Williams 1997).

Ethical approval for this study was granted by the Ethics Committee for the Social Sciences and Humanities, University of Antwerp (preliminary positive advice on 13 Dec 2019; final positive advice on 28 Feb 2020). All participants were given information about the research, including the guarantee of confidentiality, the right to withdraw from this research at any stage, and the right to see their data being collected throughout the research process. Each participant provided written consent regarding the use of their information.

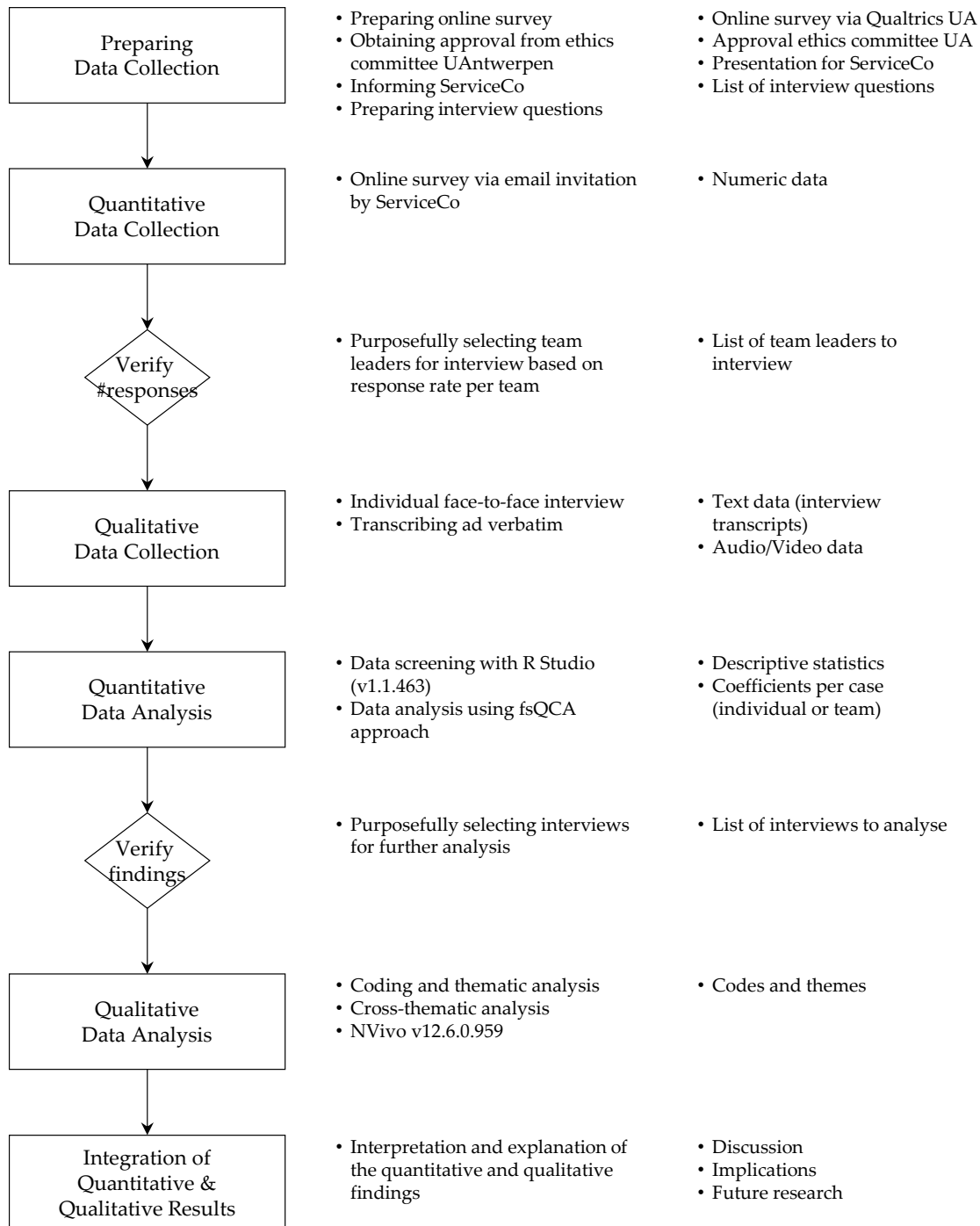


Figure 6.2 Mixed-Methods Sequential Explanatory Design approach

6.2.2 Data collection procedures

The study was conducted in February 2020 at a medium-sized professional services company in Belgium, hereafter called 'ServiceCo', providing customer interaction services to corporations in the finance and insurance sector. The company is organized in teams, each dealing with a specific product or service and headed by a team leader.

The management of ServiceCo took care of the recruitment of participants for this study. An information document was provided, describing the purpose, benefits, risks, and the right to leave the study at any time. Participation to this study was on a voluntary basis only. Those people that were interested, could click on a hyperlink, provided in the invitation, to start the survey, using the Qualtrics online survey application provided through the University of Antwerp. After their written consent, the data collection could begin.

The sequential process of collecting empirical data was designed to allow a pragmatic approach in selecting the appropriate team leaders for interviewing. Studies of Timmerman (2005) and Allen et al. (2007), for example, note that sampling fewer than all the team members can produce significant distortion of aggregated team findings. Therefore, the management of ServiceCo invited only the team leaders of those teams with a response rate $\geq 40\%$ for an interview, again on a voluntary basis. The face-to-face interviews took place in a dedicated meeting room at the premises of ServiceCo, where nobody could enter or disturb the interview. After a brief introduction and signing of the consent form, the interviewer-researcher started the interviews following a semi-structured protocol (see Appendix 1: Semi-structured interview guide), carefully drafted and pretested with an expert outside this study. This protocol started with a general question followed by more focused questions, and finally to close with personal questions. The goal of this approach was to maximize an atmosphere of trust where the interviewee could answer freely and honestly, and to minimize interview bias (e.g., Williams 1964).

6.3 Quantitative study

6.3.1 Measures & data analysis

Personal spiritual leadership and well-being. The level of personal spiritual leadership and well-being were assessed using the Personal Spiritual Leadership Survey (Rev 4/2018). Included questions are “I have the courage to stand up for what I believe in.”; “I have a personal vision that is clear and compelling to me.”; “I always do my best because I have faith in myself.” The questionnaire utilizes a response set, ranging from “strongly disagree” (1) to “strongly agree” (5). This survey is divided in nine sections: vision, altruistic love, hope/faith, meaning/calling, membership, inner life, satisfaction with life, organizational commitment, and productivity. Personal spiritual leadership comprises vision, altruistic love, hope/faith. Personal well-being refers to meaning/calling and membership.

Team spiritual leadership and well-being. To assess the level of spiritual leadership and well-being in the group, participants were asked to fill in the revised Spiritual Leadership Survey (Rev 1/2018). Example questions are “My team’s purpose inspires my best performance.”; “I set challenging goals for my work because I have faith in my team members and want us to succeed.”; “The members in my team are honest and without false pride.” The questionnaire utilizes the same response set, ranging from “strongly disagree” (1) to “strongly agree” (5). This survey has the same nine sections: vision, altruistic love, hope/faith, meaning/calling, membership, inner life, satisfaction with life, organizational commitment, and productivity. Team spiritual leadership includes vision, altruistic love and hope/faith. Team well-being refers to meaning/calling and membership.

Inner life. The Mindful Attention Awareness Scale (MAAS; Brown & Ryan 2003) was used to measure levels of dispositional mindfulness. Included questions are “I find myself doing things without paying attention.”, “I rush through activities without being really attentive to them.” Studies provided evidence that “MAAS not only predicts well-being outcomes but also has value in the study of the temporal and situational dynamics of self-regulated behavior and well-being” (Brown & Ryan 2003: 843). The findings of MacKillop & Anderson (2007) largely support the validity of the MAAS and its measure is not related to gender. Hence, in this study, the MAAS score is considered as an adequate indicator for the level of inner life. It is a single factor scale which uses 15 items rated from one (“almost

always”) to six (“almost never”). Higher mean scores indicate greater dispositional mindfulness.

Coherent Interaction. The study in chapter 4 posits that spiritual leadership occurs through a coherent interaction between the spiritual leadership variables (i.e., shared vision, altruistic love, hope/faith). This interaction can be expressed using the standard deviation σ of the spiritual leadership scores for each variable. To make the measure a coefficient, it is divided by the maximum score (=5). The coherent interaction (CI) is calculated as follows: $CI = 1 - (2\sigma/5)$. The coherent interaction at the team level is calculated in the same way with all (team) spiritual leadership scores per team.

The quantitative data from the measures were analyzed using RStudio v1.1.463, including means and standard deviation, normality tests, Cronbach’s alpha, and correlations.

6.3.2 Sample demographics

211 team members were invited to participate across fourteen teams. A total of 134 individuals from these teams actually participated in the quantitative study. However, consistency was verified on a number of variables throughout the survey (such as inner life) and 48 responses were excluded (or 36%). This entails a net response rate of 64% or 86 participants in total with age ranging from 18 to 74 years ($M=35.3$; $SD=12.7$) and an average company seniority of 2.2 years ($SD=2.2$). Table 6.1 displays an overview of the sample demographics.

Table 6.1 Sample demographics (quantitative study).

	<i>n=86</i>	<i>%</i>
Gender		
Male	32	37%
Female	53	62%
Unspecified	1	1%
Educational level		
Primary	1	1%
Lower secondary	8	9%
Higher secondary	46	53%
Bachelor	21	24%
Master or higher	10	12%
	<i>mean</i>	<i>sd</i>
Seniority		
In company (years)	2.2	2.2
In team (years)	1.8	2.0
Age (y)	35,3	12,7

6.3.3 Findings

Performance on MAAS, used as an indicator for Inner Life, is normally distributed (Shapiro-Wilk normality test: $W=0.98$, $p\text{-value}=0.16$). Cronbach's alpha indicates excellent internal reliability, $\alpha=0.93$. The mean performance was 4.38 ($SD=0.83$). There is also no significant difference in terms of gender ($p>0.8$) between women ($M=4.37$; $SD=0.81$) and men ($M=4.41$; $SD=0.85$). Therefore, no further gender difference is made.

Table 6.2 displays the means, standard deviations, and correlations of the variables. The internal reliabilities, using Cronbach's alpha, are shown on the diagonal in **bold**. Spiritual leadership (SL) is the average of the scores vision, hope/faith and altruistic love from the survey. Spiritual well-being (SWB) is the average of the scores calling and membership. 'Personal' refers to the Personal Spiritual Leadership Survey, while 'Team' refers to the (team) Spiritual Leadership Survey (see 6.3.1 Measures).

Table 6.2 Sample means, standard deviations, correlations and reliabilities.

Variable	Mean	SD	1	2	3	4	5	6
1. Inner life (MAAS)	4.38	0.83	0.93					
2. Personal Spiritual Leadership	3.85	0.45	0.29	0.83				
3. Personal Spiritual Well-being	3.74	0.51	0.30	0.54	0.77			
4. Personal Coherent Interaction	0.80	0.11	-	-	-	-		
5. Team Spiritual Leadership	3.62	0.47	0.25	0.29	0.31	-	0.85	
6. Team Spiritual Well-being	3.64	0.54	0.33	0.26	0.33	-	0.57	0.79

n=86. Correlations (Kendall τ) significant at $p < 0.01$. Internal reliabilities are on the diagonal in bold.

Table 6.3 Sample means per team.

Team	Response	Resp.rate	TCI	TIL	TSWB
T1	7	33%	0,704	4,30	3,72
T2	8	42%	0,704	4,68	4,1
T3	8	38%	0,684	3,85	3,28
T4	2	10%	0,564	3,95	3,26
T5	5	33%	0,804	4,94	3,83
T6	10	91%	0,688	4,17	3,35
T7	5	38%	0,668	3,84	3,13
T8	4	25%	0,712	4,70	3,97
T9	9	69%	0,712	4,88	4,16
T10	6	55%	0,688	4,30	3,73
T11	4	33%	0,708	4,88	3,63
T12	8	62%	0,66	4,03	3,39
T13	5	33%	0,72	4,36	3,58
T14	5	50%	0,552	4,66	3,63
Total	86	41%	0,792	4,38	3,64

n=14. TCI: Coherent Interaction – TIL: Inner Life (MAAS) – TSWB: Team Spiritual Well-Being

Table 6.3 shows the sample means at the team level. Note that these figures are calculated with the personal scores. The team coherent interaction refers to the coherent interaction at the team level using the team spiritual leadership scores of the team members participated in the study. Response rate per team varies from 10% to 91% (M=41%).

6.3.4 Calibration

Similar to the approach described in the previous chapter (section 5.2.8), this study uses a fuzzy set QCA approach (Ragin 2008; Fiss 2011; Schneider & Wagemann 2012; Fiss et al. 2013) to evaluate the Boolean expression: $IL \times CI \rightarrow SWB$. This implies that data are first calibrated in fuzzy set membership scores between 0 and 1 according to the degree of presence of the condition in a specific case, using a continuous fuzzy set scale. Interval-scale variables are converted into fuzzy set values, using packages QCA v3.4 and SetMethods v2.4 (Oana & Schneider 2018) within RStudio v1.1.463. Unlike standard interval measures, fuzzy sets assign a quality to the variation. Membership has to be “purposefully calibrated” (Ragin 2008: 30). These qualitative anchors “make it possible to distinguish between relevant and irrelevant variation” (Rihoux & Ragin 2009: 92). The fuzzy set anchors used in this study are shown in Table 6.4 and further explained below.

Table 6.4 Fuzzy set construction.

<i>Variable</i>	<i>Code</i>	<i>Set construction break-points</i>	
Inner Life	IL	Fully in:	6.0
		Cross-over:	3.0
		Fully out:	1.0
Spiritual Well-Being	SWB	Fully in:	4.0
		Cross-over:	3.0
		Fully out:	2.0
Coherent Interaction	CI	Fully in:	0.80
		Cross-over:	0.60
		Fully out:	0.40

For the sample being studied, as an indicator for Inner Life, the MAAS score mean is 4.38 (SD=0.83), ranging from 2.1 to 6.0. Studies of Brown & Ryan (2003), however, found a mean of 4.38 (SD=0.65) among active Zen practitioners, and 3.97 (SD=0.64) for their comparison group. Also, MacKillop & Anderson (2007) found a MAAS score mean of 4.0 (SD=0.85) among 727 college students. Therefore, the ‘fully in break-point’ is set at the maximum score of 6, the ‘fully out break-point’ at the minimum score of 1, and the ‘cross-over’ at 3. Spiritual Well-Being (SWB) is the outcome of spiritual leadership. Scores above 4 are satisfactory, while scores below 3 indicate the need for improvement (based on PSL Rev 4/2018). Hence, break-points are set at 2 (fully out) – 3 (cross-over) – 4 (fully in). Following

the study in the previous chapter, the break-points for Coherent Interaction are set at 0.4 for being fully incoherent (or fully out) and 0.8 for being fully coherent (or fully in). Cross-over is set at 0.6.

Table 6.5 Fuzzy set spiritual leadership measures.

Personal Spiritual leadership (n=86)	IL_fs	CI_fs	ILxCI	
<i>Consistency (sufficiency)</i>	93%	89%	94%	
<i>Coverage</i>	86%	94%	83%	
Team Spiritual Leadership	IL_fs	CI_fs	ILxCI	SWB_fs ↓
Team 9	0.86	0.84	0.84	0.97
Team 2	0.84	0.82	0.82	0.96
Team 10	0.78	0.79	0.78	0.90
Team 14	0.84	0.33	0.33	0.87
Team 12	0.73	0.71	0.71	0.76
Team 6	0.76	0.79	0.76	0.74
<i>Consistency (sufficiency)</i>	99%	99%	99%	
<i>Coverage</i>	92%	81%	81%	

IL: Inner Life; CI: Coherent Interaction; SWB: Spiritual Well-Being; _fs: fuzzy set

Applying the fuzzy set break-points of Table 6.4 to the data leads to the figures shown in Table 6.5 below, for both personal and team spiritual leadership.

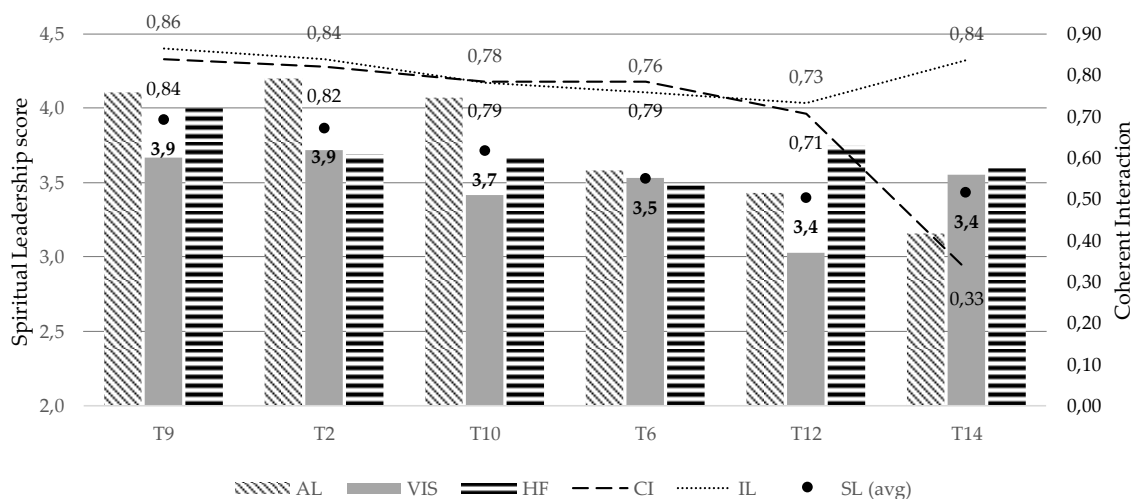


Figure 6.3 Case comparison Spiritual Leadership variables.

Figure 6.3 gives an overview of the spiritual leadership variables per case (team), presented as bars, as well as the level of coherent interaction (CI) and Inner Life (IL). Note that the average score of spiritual leadership (SL) is independent of the coherent interaction (CI). For example, T9 and T2 have the same SL score but different CI. On the other hand, T10 and T6 have the same CI but different SL. In the revised model of spiritual leadership, CI and IL are taken into account to determine the emergence of spiritual well-being.

6.3.5 Discussion

Consistent with the model of spiritual leadership, the findings presented in Table 6.2 show that inner life has a positive influence on the spiritual leadership variables, i.e., vision, hope/faith, and altruistic love, which adds further support to the study by Jeon et al. (2013) and by Fry et al. (2017). As such, it highlights its importance for individuals, and for organizations in providing a context that fosters an inner life practice, for example, a room for inner life practices (e.g., meditation, yoga, prayer), or personal leadership development opportunities (Fry & Nisiewicz 2013). The findings in this study also indicate a positive relationship between personal and team spiritual leadership, supporting the theory put forward in this dissertation.

The consistencyⁱ of the set-relationship IL x CI is above 90%, while coverage is above 80%, across all cases (individual and team). The conditions IL and CI have also high consistency scores indicating strong relationship with SWB. However, there are still cases where the relationship does not apply (e.g., team 6).

The evidence examined in this study supports also hypotheses (H1 and H2; section 6.1) that inner life practice and coherent interaction can be usefully deployed in a consistent way to understand the emergence of spiritual well-being through entrainment, across the individual and group level, using the breaking-points from Table 6.4. This is in line with the findings in the previous study (see section 5.3.1).

ⁱ Consistency percentage evaluates the degree of support among the cases of a subset. Consistency is to set relationships as p-value is to statistical inference; the higher the consistency, the stronger the set-theoretical relationship (Schneider & Wagemann 2012). Rule of thumb is to look for relationships with consistencies greater than 90% for necessary conditions, and 80% for sufficient conditions; the coverage percentage, on the other hand, evaluates the proportion of the membership scores in an outcome that a particular configuration explains (Ragin 2000; Schneider & Wagemann 2012).

Figure 6.3 shows the spiritual leadership variables of the different cases (teams), where SL is the average of the scores Vision, Hope/Faith and Altruistic Love. It clearly illustrates the coherent interaction approach. Although the cases T9 and T2 have the same average for spiritual leadership, the coherent interaction (dashed line) differs due to the variance of the spiritual leadership variables. Case T6 has a relatively high coherent interaction with a moderate spiritual leadership average, while case T14 has a low coherent interaction for a similar average. As an example, looking at the case T9 more closely, the Vision variable is on average lower than the variables Hope/Faith and Altruistic Love; a high variance is identified on the questions “My team’s vision inspires my best performance” and “My team’s vision is clear and compelling to me.” Working on a clear and compelling vision for that team could improve the coherent interaction, and as a result, spiritual well-being.

6.4 Qualitative study

6.4.1 Interview guide & data analysis

The face-to-face interviews were recorded and subsequently transcribed ad verbatim. Interviews followed a semi-structured protocol (see Appendix 1: Semi-structured interview guide). Open questions were carefully prepared with the support of an expert in this field. They were structured around the spiritual leadership variables, i.e., vision, altruistic love, hope/faith and inner life, within the context of the onboarding of a new team member. E.g. what do you tell the newcomer about the goals of your team (vision); what do you think is important that the newcomer should know about how to interact with each other (altruistic love); what do you want her/him to know about how you getting things done in the team (hope/faith); what do you tell him/her about how you as a team look at personal growth (inner life practice). The interviewer-researcher adopted an attitude of ‘not knowing’ and ‘non-judgement’, regularly asking for clarifications and illustrations to better understand the underlying meaning of the discourse.

The qualitative data were analyzed according to a four-step approach, with the support of the software NVivo 12. First, one transcript (or case) was read and sentences were coded based on the content of the sentence. Second, the identified codes formed a codebook for the coding of the other transcripts, to which new codes could also be added. Third, codes

of all transcripts were grouped into meaningful themes. Finally, the themes were grouped according to the spiritual leadership variables. An independent expert verified step two to four to enhance internal validity. How do teams differ on these variables, is the guiding research question of this analysis.

6.4.2 Sample demographics

For the qualitative study, seven team leaders participated with age ranging from 26 to 50 years ($M=34.4$; $SD=8.0$) and an average company seniority of 4.7 years ($SD=3.4$). Table 6.1 gives an overview of these sample demographics. Due to inconsistent data, the case T1 has been excluded based on a too low response rate. In addition, case T9 has been excluded because the team leader was leading the team only very recently. The interviews of the remaining five team leaders (T2, T10, T6, T12, T14) were taken into account for further analysis.

Table 6.6 Sample demographics (qualitative study).

	<i>n=7</i>	<i>%</i>
Gender		
Male	4	43%
Female	3	57%
Unspecified		
Educational level		
Primary	1	14%
Lower secondary	1	14%
Higher secondary	2	28%
Bachelor	2	28%
Master or higher	1	14%
	<i>mean</i>	<i>sd</i>
Seniority		
In company (years)	4.7	3.4
In team (years)	3.6	2.9
Age (y)	34,4	8,0

6.4.3 Findings about Inner Life/Personal Growth of the team leaders

The spiritual leadership variable “Inner Life” describes “the extent to which one has a mindful practice or seeks mindful awareness” (Spiritual Leadership Survey - Rev 1/2018). The quantitative phase of this study highlights the influence and correlation of this variable to the other spiritual leadership variables: vision, hope/faith, and altruistic love (cf. Table 6.2).

Figure 6.4 presents the practices that the team leader uses for the development of his inner life and personal growth. The vertical axis refers to the number of coding references.

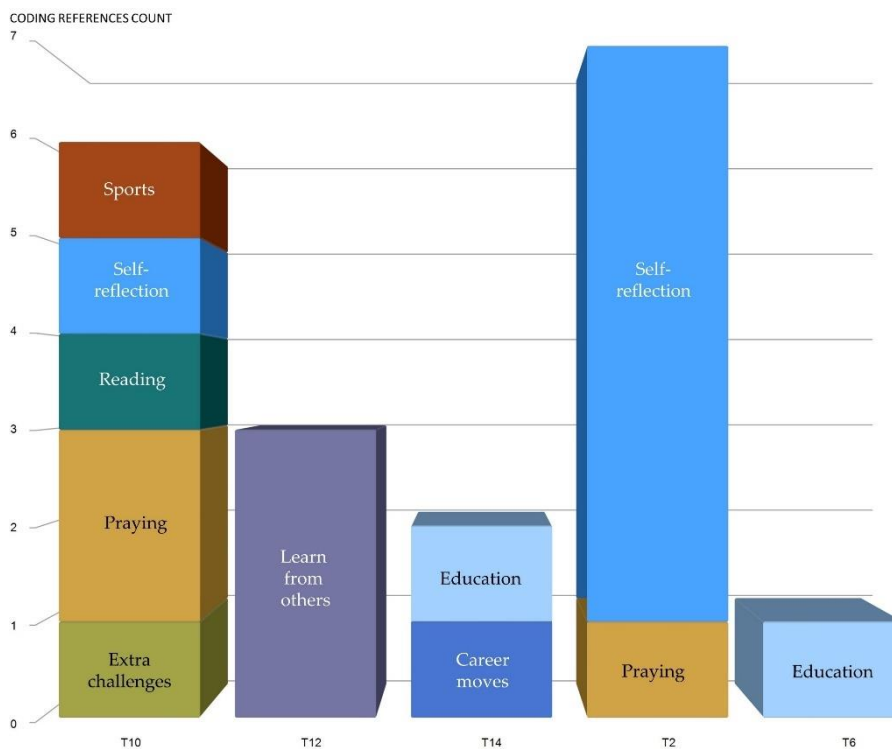


Figure 6.4 Findings about Inner Life/Personal Growth - Team Leaders.

Team leader T10 uses a variety of practices, while self-reflection was the most important practice of team leader T2:

“Especially the reflection. I mainly see ... I take a lot of reflection moments” (T2) ⁱ

ⁱ Original text in Dutch: “Vooral de reflectie. Ik zie vooral... ik neem heel veel reflectie momenten.”

“Reflect, get the points out for myself: what was sincere, what wasn’t for me, and then I will indeed measure ‘is that the growth that I want to experience?’.” (T2) ⁱ

Seek feedback and learn from others were the practices of team leader T12. This entails, for example, engaging with experts, feedback conversations with manager for personal growth, but also learn consciously to do a task independently.

6.4.4 Findings about Inner Life/Personal Growth

Figure 6.5 presents the ways how ServiceCo and its team leaders support employees in their personal growth efforts from the viewpoint of the interviewee (i.e., the team leader).

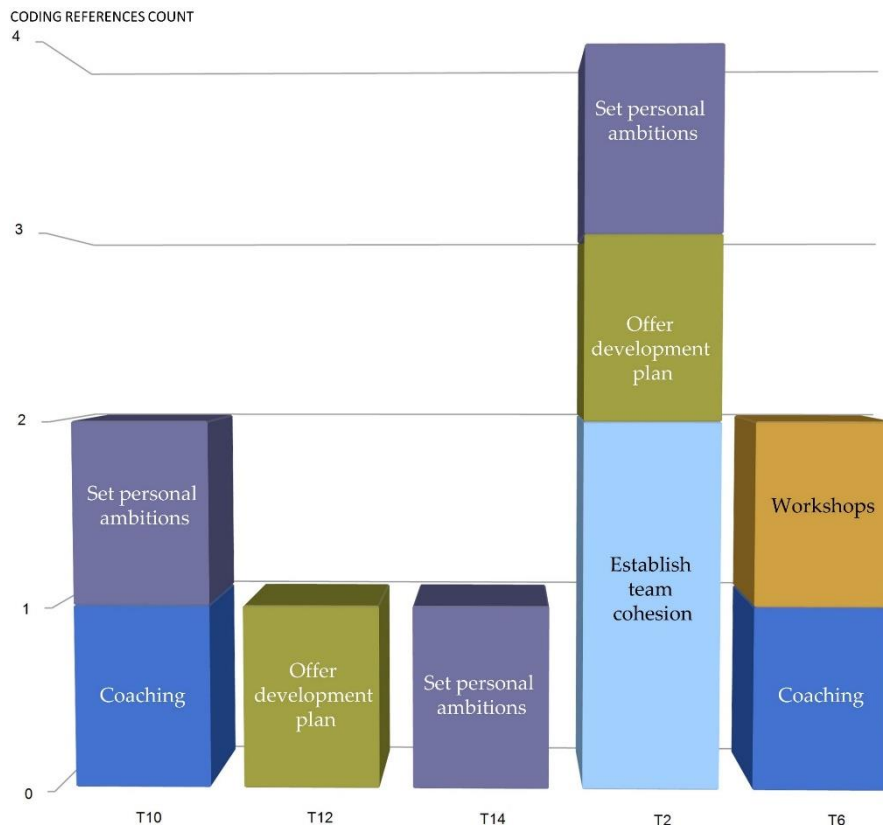


Figure 6.5 Findings about Inner Life/Personal Growth.

Setting personal ambitions for growth is seen as the main way to support their team members in their personal growth, and, to a lesser extent, coaching and offering a

ⁱ Original text in Dutch: “Reflecteren, voor mezelf de punten eruit halen: wat was oprecht, wat was voor mij niet, en dan ga ik inderdaad meten van ‘is dat de groei die ik wil meemaken?’”

development plan. From all interviewees, only team leader T2 paid attention to team growth, through the creation of team cohesion.

6.4.5 Findings about Vision

The spiritual leadership variable “Vision” refers to “the team’s journey and why we are taking it; defines who we are and what we do” (Spiritual Leadership Survey - Rev 1/2018). For this study, the interviews focused especially on the goals that the teams are facing, with the question: “How do you tell him/her about your team goal?”.

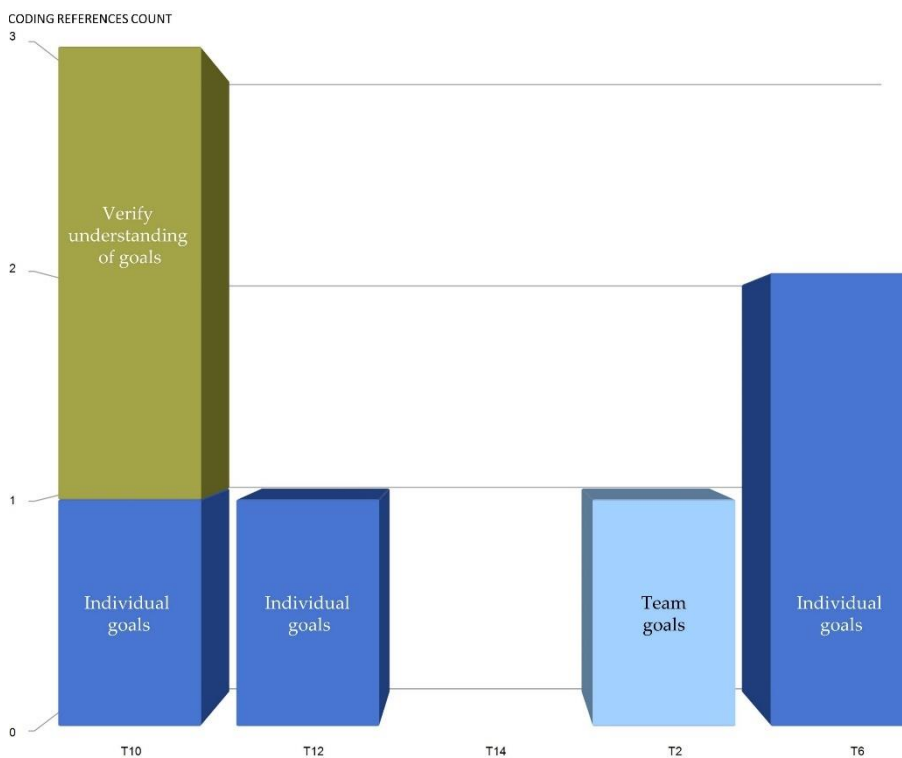


Figure 6.6 Findings about Vision.

Although the focus was on the team, goals at ServiceCo are typically set at the individual level (see Figure 6.6). However, team leader T2 mentioned team goals more clearly, as follows:

“As a team leader it is important to me that we have objective, predefined objectives, which are mapped very clearly. That also, as I said at the beginning, already agreed, that is what we do as a team, that is what we expect, that is what the company expects from us, and again, what role you have in this.” (T2) ⁱ

Team leader T10 makes sure that team members are on the same page and responds especially on their body language to intervene:

“... if I just see agents frowning or doing something like ‘that’ or body language, I pick it up, at that moment, not later, not an hour later, at that moment. Then I ask if it is not clear to you, then I will stop the briefing.” (T10) ⁱⁱ

6.4.6 Findings about Hope/Faith

The spiritual leadership variable “Hope/Faith” describes “the assurance of things hoped for, the conviction that the team’s vision/goal will be fulfilled”, which entails demonstrating faith through action, perseverance and exerting extra effort, and setting challenging goals (Spiritual Leadership Survey - Rev 1/2018). The main question used to gauge this is “What do you think is important that she/he knows how to get things done to achieve the team goals?”.

The sharing of performance data actively during team meetings, where the team stands, what is coming, but also how the team made a difference, has been mentioned by the majority of the team leaders for achieving the team goals (see Figure 6.7).

“... some numbers ... we don’t need to know everything because it just doesn’t matter, but you do share the numbers where they made a difference” (T12) ⁱⁱⁱ

ⁱ Original text in Dutch: “Als teamleider is voor mij belangrijk dat we objectief hebben, voor-gedefinieerde objectieven, die heel duidelijk in kaart worden gebracht. Die ook, zoals ik zei in het begin, al afgesproken, dat is wat we doen als team, dat is wat we verwachten, dat is wat het bedrijf van ons verwacht, en nogmaals, welke rol je hierin hebt.”

ⁱⁱ Original text in Dutch: “... als ik gewoon agents zie fronsen of efkes zo doen of een lichaamstaal, dan pik ik dat op, op dat moment, niet later, niet één uur later, op dat moment. Dan vraag ik is het niet duidelijk voor u, dan stop ik de briefing.”

ⁱⁱⁱ Original text in Dutch: “... sommige cijfertjes... we moeten niet alles weten omdat het gewoon niet van belang is, maar dat je wel de cijfers deelt waar dat zij een verschil in hebben gemaakt.”

In addition, some attitudes were mentioned, such as, “give the best of yourself”, “believe in people”, “get the best out of people”, and “keep goal in mind”.

“If you choose to work with people, you have to give the best of yourself, because those people deserve to look up to a team manager.” (T10) ⁱ

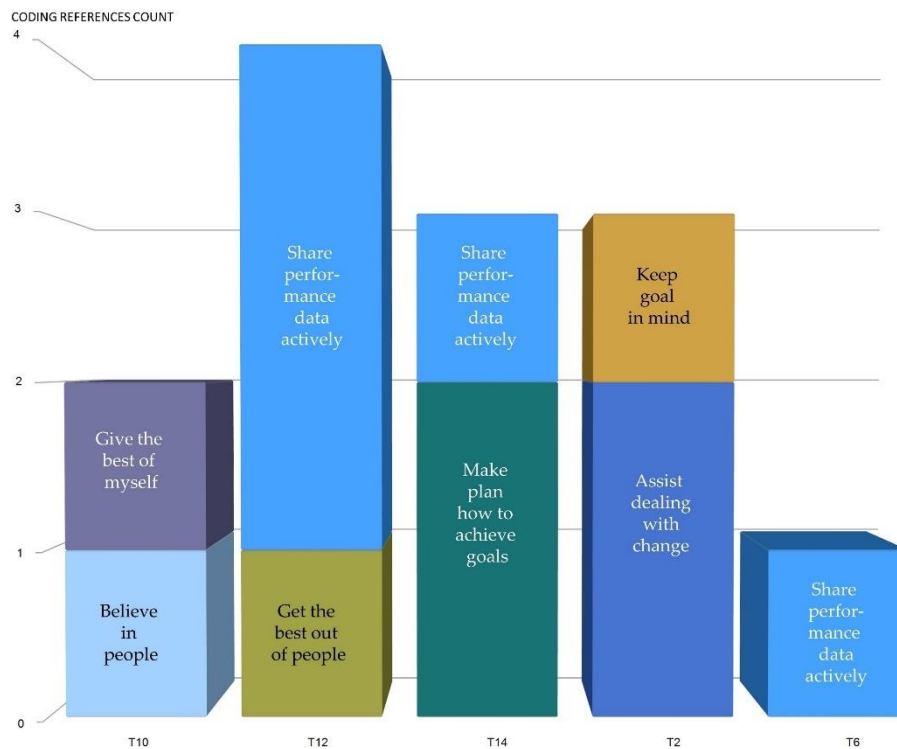


Figure 6.7 Findings about Hope/Faith.

6.4.7 Findings about Altruistic Love

The spiritual leadership variable “Altruistic Love” describes “a sense of wholeness, harmony, and well-being produced through care, concern, and appreciation for both self and others” (Spiritual Leadership Survey - Rev 1/2018).

ⁱ Original text in Dutch: “Als je kiest om met mensen te werken, dan moet je het beste van je zelf geven, want die mensen verdienen dat om op te kijken naar een teammanager.”

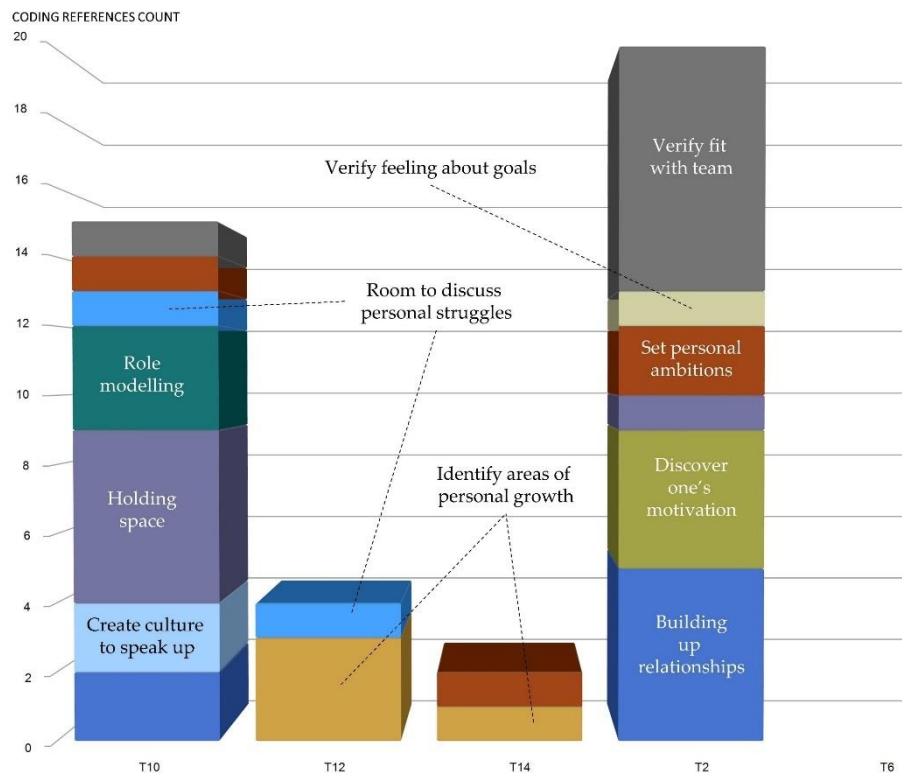


Figure 6.8 Findings about Altruistic Love.

Throughout the interviews, a variety of such 'care expressions' were identified, except with team leader T6, as shown in Figure 6.8. Those that were often mentioned, based on the coding references, are:

- **Verify fit with team** entails, for example, assessing what the person knows about team, how he/she experiences the team, how he/she fits in the team, meaning for each other as team, but also listening to his/her expectations towards the team leader.
- **Holding space** encompasses offering space to ventilate experiences or feelings, making room for discussion or time alone, responding to body language.
- **Discover one's motivation**, because it differs according to one's perception, and can be measured through the experiences evoked while executing the job.
- **Building up relationships**. It is the offering of space and time for the development of relationships and how to interact in a team without much intervention of the team leader.

6.4.8 Discussion

The goal of this qualitative phase is to explain or elaborate on the findings of the quantitative phase, and to find an answer on how do teams, from their team leader's perspective, differ on the spiritual leadership variables?

The findings, presented in the earlier sections above, give a more detailed view. Table 6.7, on the other hand, displays a comparison of these differences between teams with higher scores of spiritual well-being (i.e., T2 and T10) and teams with lower scores (i.e., T12 and T14).

Table 6.7 Team differences in spiritual leadership variables.

	Higher scores SWB	Lower scores SWB
Inner Life	More specific inner life practices (e.g., prayer, reflection)	Especially learning from others
Altruistic Love	More and diverse way to care for each other	Limited to personal growth and ambition of the team members
Vision	Attention for team goals and the verification if goals are well understood	Focus on individual goals
Hope/Faith	Focus on attitude (e.g., believing in people, assisting in change)	Focus on actively sharing performance data

The major differences are found for Inner Life and Altruistic Love. Teams with higher spiritual well-being scores pay attention to inner life practices, such as prayer, reflection, and use a diverse set of ways to take care of their team members. These findings are in line with the higher measured team scores for IL and AL, shown in Figure 6.3, as well as with higher scores of the team leaders' personal and team SWB scores. However, the individual Inner Life scores do not reflect this difference.ⁱ

For Vision and Hope/Faith, the differences are less outspoken. However, teams with lower SWB scores focus more on individual goals and sharing of performance data, while the

ⁱ These individual scores are not shown in the data presented in this dissertation.

other team leaders pay also attention to certain attitudes, such as believing in people, verification of the goals through body language, and assisting in change.

Appendix 2: Codebook Spiritual Leadership Variables gives a structured overview of all codes used in this qualitative study.

6.5 Conclusion, limitations and future research

The objective of this empirical study presented in this chapter is twofold: (1) with a quantitative study, to verify if inner life moderates the coherent interaction among the spiritual leadership variables (vision, hope/faith, altruistic love), and, as a result, mediates the level of spiritual well-being, both at the individual and team level; (2) with a qualitative study to identify how teams differ on these variables.

For the first objective, this study reveals three main findings. First, it provides additional support that inner life and coherent interaction can be usefully deployed in a consistent way to understand the emergence of spiritual well-being through entrainment. In practical terms, spiritual well-being at the individual or team level can easily be assessed applying the defined fuzzy set break-points (Table 6.4) to the boolean expression $IL \times CI \rightarrow SWB$. Next, it adds further support to other studies by Jeon et al. (2013) and by Fry et al. (2017) that inner life has a positive influence on all spiritual leadership variables, i.e., a fundamental source for the development of shared vision, hope/faith, and altruistic love (Fry 2008). Finally, this study indicates a positive relationship between personal and team spiritual leadership, supporting the theory put forward in chapter 4. This entails that developing personal spiritual leadership directly influences the level of spiritual leadership of the group to which the individual belongs.

In light of the second objective, the study identifies two major things that teams with higher spiritual well-being scores do differently. First, they pay attention to inner life practices, such as prayer and reflection, and use a more diverse set of ways to take care of their team members. Also those team leaders have an outspoken practice on regular basis. The findings are in line with the higher measured team scores for Inner Life and Altruistic Love from the quantitative study. Second, they focus attention to certain attitudes, such as believing in people, verification of the goals through body language, and assisting in

change. Both contribute to the literature of spiritual leadership and highlights the importance of having an inner life practice for individuals, and for organizations in providing a context that fosters an inner life practice (e.g., a space for meditation, yoga or prayer; offering personal leadership development opportunities).

The research presented in this chapter brings about a number of limitations. First, the empirical studies have been conducted in a context of a professional customer interaction services organization that tend to be of a higher practical nature, limiting generalization towards more complex service organizations. In addition, surveys were conducted in their original language, English, although the participants are primarily native Dutch speakers. This influences individuals' response, especially when cultural norms and values are assessed (see for example Harzing 2016; Harzing & Maznevski 2002; Ralston, Cunniff & Gustafson 1995). Third, the qualitative data has been collected through informant interviews, which limits the richness of the analysis. Next, sampling fewer than all the team members may lead to several Type II errors, i.e., accepting a false hypothesis (Allen et al. 2007; Timmerman 2005). Fifth, single interviews with whom the interviewer has never met or spoken may also fail to obtain vital contextual information that would more likely surface across multiple interviews (Patton 1989; Mishler 1986). Finally, although the research process has been designed and executed with care, the empirical data and analysis is subject to the unarticulated beliefs and convictions of the researcher. Therefore, the findings presented are not to be generalized to other contexts, except for theoretical generalization.

Future research could address the sampling of all team members and the conducting of multiple interviews, but could also use actual organizational performance indicators that are equally important across all teams. Another approach for future research could be that of an intervention, where teams are coached or trained in one or more spiritual leadership variables.

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Appendix 1: Semi-structured interview guide

The interview was done in Dutch. After a brief introduction and signing of the consent form, the following interview guide was followed. (Translation of the question in English is provided below each question.)

- Stel, er komt iemand nieuw in uw team en u hebt uw eerste welkom of 'onboarding' gesprek, wat vertelt u hem/haar?
Imagine, someone new to your team and you have your first welcome or onboarding conversation, what are you telling him/her?
- Hoe vertelt u hem/haar meer over jullie doel als team?
How do you tell him/her about your (team) goal?
- Wat vindt u belangrijk dat zij/hij weet over hoe jullie met elkaar omgaan in uw team?
What do you think is important that she/he knows how you interact in your team?
- Wat vindt u belangrijk dat zij/hij weet over hoe jullie zaken voor elkaar krijgen om de teamdoelstellingen te bereiken?
What do you think is important that she/he knows how to get things done to achieve the team goals?
- Wat vindt u belangrijk dat zij/hij weet over hoe jullie als team kijken naar persoonlijke groei en ontwikkeling?
What do you think is important that she/he knows about how you as a team look at personal growth and development?
- Welk advies geeft u haar/hem om succesvol te zijn in het team
What advice do you give her/him to be successful in the team?
- Welk advies geeft u haar/hem om met plezier te kunnen werken
What advice do you give her/him to work with pleasure?
- Vanuit uw eigen ervaring, welke ongeschreven regels wilt u doorgeven?
From your own experience, what unwritten rules do you want to pass on?
- Vanuit uw eigen ervaring, in uw advies, wat zegt u dat zij/hij moet voor oppassen, van wegblijven, niet doen?
From your own experience, in your advice, what do you say she/he should watch out, stay away from, not do?
- Vanuit uw rol als leidinggevende, wat vertelt u over uzelf en uw eigen zingeving?

In your role as manager, what do you tell about yourself and your own (life) meaning?

- Vanuit uw rol als leidinggevende, welke rol of leiderschapsstijl neemt u op naar de teamleden? Hoe doet u dit? Hetzelfde voor de nieuwkomer?

In your role as a manager, what role or leadership style do you have with the team members? How do you do this? The same for the newcomer?

- Hoe zult u haar/hem motiveren?

How will you motivate her/him?

- Hoe belangrijk is persoonlijke groei voor u? Wat houdt dit dan in voor u?

How important is personal growth to you? What does this mean?

- Zijn er nog vragen of opmerkingen i.v.m. dit interview?

Are there any questions or comments regarding this interview?

Appendix 2: Codebook Spiritual Leadership Variables

Variable / description	Interviews ⁱ	References
VISION		
INDIVIDUAL GOALS	4	5
set goals to each team member - team or individual goals	1	1
team goals set individually	3	4
TEAM GOALS	2	5
explain team goals to team	1	1
important to have clear team objectives	1	1
team goals set along the way	1	3
VERIFY UNDERSTANDING GOALS	1	4
body language as means to verify understanding goals	1	2
important that agent knows what we are talking about in team meeting	1	1
important to have all agents on the same page (TL)	1	1
ALTRUISTIC LOVE		
BUILDING UP RELATIONSHIPS	3	8
giving no tips how to interact in team	1	1
how to interact is a learning process	1	3
person needs to self-intervene	1	1
realize impact of one's approach	1	1
relationship with team members are built up	1	1
team meeting as opportunity to learn something personally from each other	1	1
CREATE CULTURE TO SPEAK UP	1	2
kind of shame of not speaking up by agents	1	1
loosen up meetings	1	1
DISCOVERING ONE'S MOTIVATION	1	5
measuring experiences to discover one's motivation	1	2
motivation differs according to one's perception	1	1

ⁱ All seven interviews were coded and included in this codebook.

Variable / description	Interviews ⁱ	References
need to discover one's motivation	1	2
HOLDING THE SPACE	3	8
make room for discussion in team	1	1
offering space to ventilate experiences or feelings	1	1
reading body language	1	3
sensing people well	1	2
some agents need some time alone	1	1
IDENTIFY AREAS OF PERSONAL GROWTH	2	4
detect growth possibilities for agent and get started	1	1
indicate areas of personal growth in one-to-one (by TL)	1	1
working together with team manager on personal growth	1	2
ROLE MODELLING	2	7
people deserve having faith in their team leader	1	1
people deserve to be able to count on their team leader	1	1
people deserve to look up to their team leader	1	2
role modelling how to approach someone	1	2
team manager as role model	1	1
ROOM TO DISCUSS PERSONAL STRUGGLES	3	4
discuss people's personal struggles with their work	1	1
do something about struggles of team members	1	1
listen to struggles of people	1	1
show empathy for personal struggles as TL	1	1
SET PERSONAL AMBITIONS	4	7
discuss how to assist with personal ambitions	1	1
indicate interests for personal growth to team leader	1	1
managing of personal ambitions	1	1
need to set goals for personal growth agent	1	1
personal ambitions discussed in one-to-one	1	1
personal growth discussion in one-to-one	1	1
set higher performance levels for growth	1	1
VERIFY FEELING ABOUT GOALS	1	1
feeling about work	1	1
VERIFY FIT WITH TEAM	4	11
assess what newcomer knows about team	1	1
check fit with the role	1	1
how do you experience the team	1	1
how will you fit in the team	1	1
listen to expectations towards team leader	2	2
listen to personal ambitions	1	1
meaning for each other as team	1	3
translate personal expectations into own team goals	1	1
HOPE-FAITH		
ASSIST DEALING WITH CHANGE	1	3
motivating by dealing with change	1	1
motivation is dynamic	1	2
BELIEVE IN PEOPLE	1	1
believing in agent as of moment of hiring	1	1
GET THE BEST OUT OF PEOPLE	1	1
GIVE THE BEST OF OURSELF	1	1
need give the best as yourself as team leader	1	1
KEEP GOAL IN MIND	1	1
keep team goals in mind	1	1
MAKE PLAN HOW TO ACHIEVE GOALS	1	2
establish a plan how to achieve team goals	1	1

Variable / description	Interviews ⁱ	References
give insights how to reach goals to team member	1	1
SHARE PERFORMANCE DATA ACTIVELY	3	6
actively involve team in performance data	1	2
communicate actively about performance data with team	1	1
invite to share their good performance	1	1
share current and future situations in team meeting	1	1
share performance data where team made difference	1	1
INNER LIFE-PERSONAL GROWTH		
COACHING	3	5
extra coaching to support growth	2	3
side-by-side assistance by coaches	1	1
side-by-side important for agent	1	1
ESTABLISH TEAM COHESION	1	2
importing from personal environment in team for growth	1	1
team cohesion creates team growth	1	1
OFFER DEVELOPMENT PLAN	2	4
give assistance with their personal development plan	1	1
important to map personal growth in company	1	1
personal development plan provides room for creativity	1	1
personal growth via development plan	1	1
SET PERSONAL AMBITIONS	4	6
discuss how to assist with personal ambitions	1	1
indicate interests for personal growth to team leader	1	1
need to set goals for personal growth agent	1	1
personal ambitions discussed in one-to-one	1	1
personal growth discussion in one-to-one	1	1
set higher performance levels for growth	1	1
WORKSHOPS	2	2
company organises trainings to improve health	1	1
extra training for personal growth	1	1
INNER LIFE-PERSONAL GROWTH TEAM LEADER		
CAREER MOVES	1	1
verify career opportunities for further growth	1	1
EDUCATION	2	2
evening school for personal growth	1	1
learning something new is useful	1	1
EXTRA CHALLENGES	2	3
entrepreneurship as way of personal growth	1	1
keep challenging myself	1	1
personal growth via something extra	1	1
LEARN FROM OTHERS	2	5
engage with experts to learn from	1	2
feedback conversations with manager for personal growth (TL)	1	1
growth and development by talking	1	1
learn consciously to do it independently	1	1
PRAYING	2	3
praying as personal growth	1	1
praying is automaticity	1	1
religious rituals	1	1
READING	2	4
reading books for personal growth TL	2	4
SELFRELECTION	3	9
do things that are in my blood as personal growth	1	1
planning of self-reflection moments	1	2

Variable / description	Interviews ⁱ	References
self-reflection for personal growth	2	5
self-reflection sporadically	1	1
SPORTS	1	1
more sports for personal growth TL	1	1

Conclusion

This dissertation seeks to answer the question of how to foster intraentrainment in organizations. It led to a journey that shed light on different aspects of organizational entrainment, and eventually proposed the spiritual leadership model as an answer to this question. A first stop on this journey consisted of generating an overview and current understanding as to what constitutes entrainment in organizations, while providing a common vocabulary that could assist scholars in further research. This literature review also identified that the exploration of organizational intraentrainment has been limited, notwithstanding its importance for improved organizational outcomes, as well as the use of leadership constructs to answer the call on how to develop the skills to manage these rhythms over time and the ability to take part in this entrainment process. The thematic analysis revealed that the concept of entrainment has contributed to six major fields: organizational performance (outcomes), organizational theory, time, change, knowledge management and integration, and emotion in groups.

A second halt on the journey refined the entrainment lens with learnings borrowed from physiological entrainment of the human heart. Such a “borrowing practice”, often used by organizational scholars (Pérez-Nordtvedt et al. 2008), enabled a deeper understanding of intraentrainment. This led to the proposing of *coherence* as an additional variable of entrainment theory, and of the *Integral Entrainment Matrix* as an overall framework for entrainment. It suggested that organizational entrainment is enhanced when entrainment occurs at the same time within the system, between systems, and with the environment (i.e., in all quadrants of the matrix at the same time).

The next stop dealt with the research question and gap identified earlier on, proposing the model of spiritual leadership to drive intraentrainment in organizations. In addition, the study offered a different perspective and working of that leadership model expressed in five propositions. First, there should be a coherent interaction between the vision, altruistic love and hope/faith for spiritual leadership to occur. Second, spiritual leadership and its

consisting variables are entrained by some aspects of the external environment. Next, an inner life also enhances the interaction among these spiritual leadership variables, besides being considered as a fundamental source for the development of hope/faith, vision and altruistic love (Fry 2008). Fourth, out of this coherent interaction emerges spiritual well-being. Hence, it possesses emergent properties. Fifth, this research contends that personal spiritual leadership, or intraentrainment at the individual level, is able to enhance organizational intraentrainment. In other words, an individual in a coherent state can help others to shift into a more coherent state as well. Within individuals, it is suggested that such a state is reflected through a coherent heart rate variability, but that could not be supported by the evidence gathered.

Finally, the journey led to the collecting of evidence to test and validate the propositions put forward in this dissertation within specific boundaries. In a first phase, it was tested in a pilot within an educational environment, and in the second phase, it was tested more extensively in a professional services environment using both quantitative as qualitative data, advancing the field of organizational intraentrainment. These studies provide support that inner life and coherent interaction can be usefully deployed in a consistent way to understand the emergence of spiritual well-being through entrainment. They also add further support that inner life has a positive influence on all spiritual leadership variables. Moreover, these studies indicate a positive relationship between personal and team spiritual leadership. The comparison of teams led to the conclusion that teams with higher levels of spiritual well-being pay attention to inner life practices, such as prayer and reflection, and use a more diverse set of ways to take care of their team members. These teams focus attention to certain attitudes too, such as believing in people, verification of the goals through body language, and assisting in change.

7.1 Theoretical contributions

In terms of theoretical relevance, this dissertation makes four contributions. First, it introduces the variable *coherence* to the theory of entrainment, next to *cycles*, *interaction* and *adjustment*. Coherence describes the degree of entrainment across all cycles. It is measure indicating how well and fast an organization responds to internal and external pacers. As such, this measure highlights the importance of both internal and external entrainment into one indicator, currently under-investigated in organizational entrainment theory.

Second, the application of this refined entrainment lens to the model of spiritual leadership created a different understanding and working of that model. There should be a coherent interaction between the shared vision, altruistic love and hope/faith for spiritual leadership to occur, as opposed to the causal model suggested by Fry (2003). This implies that lower levels of shared vision, altruistic love and hope/faith are also able to foster spiritual leadership on the condition that they are coherent. In addition, an inner life also enhances the interaction among these spiritual leadership variables, out of which spiritual well-being emerges. It is not only considered as a fundamental source for the development of hope/faith, shared vision and altruistic love (Fry 2008).

The third theoretical contribution is the proposition that application of the spiritual leadership model throughout each level of an organization can drive intraentrainment in that organization. It is also suggested that personal spiritual leadership, or intraentrainment at the individual level, supports higher levels of organizational entrainment. In other words, an individual in a coherent state can help others to shift into a more coherent state as well. From a methodological point of view, applying a (fuzzy set) qualitative comparative analysis approach to the theory of spiritual leadership could stimulate a different discourse about the theory (i.e., describing the conditions for a particular outcome), but could also provide a way to take into account additional conditions that play a role in driving intraentrainment in organizations (e.g., functional roles, psychological safety). As such, using a leadership construct to foster entrainment, it not only fills a gap in the literature, but it also lays down a basis for new empirical research in the fields of spiritual leadership and organizational entrainment.

Finally, the empirical study at the professional services company contributes to the theory of spiritual leadership adding further support to other studies by Jeon et al. (2013) and by Fry et al. (2017) that inner life has a positive influence on all spiritual leadership variables. In addition, it indicates the existence of a positive relationship between spiritual leadership at the personal and team level.

Although not qualified as theoretical contributions according to Whetten (1989), this dissertation contributes to several theoretical debates. First, it contributes to the general debates to bring more awareness to integrate time-related dimensions in future organizational and process studies by situating and advancing our understanding of the time-related concept of entrainment in organizational research. Such a review not only

helps to prevent reinventing the wheel (Zorn & Campbell 2006), but “allows researchers to enhance the body of knowledge by a process of accumulation” and “can also (re)vitalize research by enabling the revolutionary nature of scientific progress” (Schryen, Wagner & Benlian 2015: 2). It brings clarity in the understanding as to what constitutes entrainment in organizations, its definitions, components, assumptions and related terms, such as synchronization and resonance. The review provides an overview to assist scholars with the proper use of the right words in describing the phenomenon of entrainment, but also to facilitate a better understanding of the different types of entrainment found in the selected articles of this review. The extensive thematic revision of the selected articles gives a thorough insight on how entrainment is used in the different research fields to explain particular phenomena, and at the same time, it highlights areas for further research.

The theoretical debate for more time-related research in strategic change, put forward by Kunisch et al. (2017), is another contribution of this dissertation. More specifically, organizational entrainment contributes to the call for the appreciation of polyphonyⁱ to clarify its multidimensional and complex nature. The Integral Entrainment Matrix, on the other hand, responds to the call for taking a more holistic perspective of the several temporal markers experienced by the organizational actors involved in strategic change. Moreover, the literature review in this dissertation highlights other forms of entrainment that can be used in future research of strategic change. Knowledge entrainment, for instance, can help to understand how change agents integrate knowledge and increase the speed of learning in organizations, while emotional and behavior entrainment can contribute to better explain the role of emotions in strategic change.

7.2 Implications for managerial practice

In these times of great uncertainty due to the covid-19 pandemic, the relevance of this dissertation for practice has only increased. To better understand the impact of such a pandemic on cultures of organizations, the Barrett Values Centre (Wiedemann 2020) surveyed nearly 1 400 employees worldwide in April-May 2020, noticing the following shifts to which this dissertation contributes:

ⁱ In an organizational context, polyphony refers to existence of multiple sets of activity cycles that are interdependent and entrained to each other for successful accomplishment (Kunisch et al. 2017).

- At the individual level, well-being shifted in importance from #26 to #5 to people personally during covid-19. Together with well-being, three other values emerged in top priority: making a difference, adaptability, and caring. These four values are at the core of spiritual leadership theory and, as suggested in this dissertation, applying the revised model at the personal level fosters entrainment and positively influences personal spiritual well-being and adaptability through care for both self and others.
- At the organizational level, caring moved up in importance from #25 to #4, adaptability/agility from #43 to #8, and well-being from #57 to #16 during covid-19. The importance of a shared vision, a key element of spiritual leadership, increased from #93 to #16. Here too, applying the revised model of spiritual leadership in each group of an organization positively influences spiritual well-being and adaptability through the process of entrainment. In addition, this dissertation advances the positive relationship between personal spiritual leadership and spiritual leadership in groups. (The study in chapter 6 could be used to evaluate the level of intraentrainment and to prepare a managerial intervention.)

In addition, this dissertation contributes to the following managerial challenges that Kunisch and colleagues (2017) identified in strategic change, a crucial concern for organizations in continuous-changing environments:

- How do managers align the timing of rhythmic events to other organizational events and processes? The rather theoretical and abstract nature of this dissertation may give an impression of irrelevance for practice. However, highlighting the existence of this specific abstract body of knowledge may provide entrepreneurs and practitioners a more comprehensive scientific foundation for generating and enhancing innovative toolsⁱ to help managers with such an alignment.
- Strategic change processes are loaded with emotions, but what types of emotions are ruling during change and how do change leaders affect change recipients' emotions and actions? The study about physiological entrainment in the human body suggests

ⁱ As an example, Rhythm Systems is a strategic execution software using organizational pacers to align departments and divisions on several structured processes. See www.rhythmssystems.com for more details.

that elevated emotions – such as appreciation, care, nonjudgment, and forgiveness – play an important role in the efficacy of the entrainment process within an individual. Through both organizational and emotional entrainmentⁱ, change leaders' actions may impact the emotions and actions of change recipients. However, further research is needed to identify to what extent emotions are impacted, when are they impacted during the change process, and how could this be measured (cf. heart coherence).

- How are strategic change processes interrelated and how can change agents make use of temporal markers in leading change? The Integral Entrainment Matrix can be used as a tool for mapping (strategic change) processes, indicating their temporal characteristics and interrelatedness. This structured approach may subsequently lead to change initiatives and managerial action.

Besides contributions to shifting organizational values and to strategic change, the importance of inner life practices for individuals (e.g., meditation, prayer, journaling, spending time in nature), and an organizational context that fosters such an inner life practice (e.g., a space for these practices; offering personal leadership development opportunities) have been highlighted several times in this dissertation.

Another contribution for management practice is the invitation to spend (more) managerial attention on how coherent the shared vision, organizational values and actions (cf. spiritual leadership variables) are aligned in practice. For example, is the fulfillment of an organization's vision demonstrated through appropriate action and within corresponding values and appreciation for both self and others. The surveys used in the empirical studies can help to verify this coherence, as discussed extensively in chapters 5 and 6.

Furthermore, the literature review raises the question to what extent leaders can be trained to quickly identify and effectively entrain and detrain themselves and their organizations. Ofori-Dankwa & Julian (2001) coined this ability as *entrainment management*. This dissertation offers some guidance in developing such a training program. First, the literature review in this dissertation could provide managers a deeper understanding and awareness of the existence of entrainment in organizations, and to which area it already has been applied. Next, the Integral Entrainment Matrix could be used to map the different

ⁱ See section 2.5.6 and/or Kelly & Barsade (2001).

internal and external cycles to which an individual, team, department or organization is exposed. Then, this outcome could be used to start aligning the different cycles to one another, and to start applying the model of spiritual leadership at each individual and group level, i.e., what is the vision or shared purpose we want to achieve. Do we have the right values, behaviors, and attitudes in place to achieve this, is the next step, followed by defining the actions needed to realize the vision. Finally, the fit with the external cycles, to which the organization needs to adapt, is verified, as well as the model of spiritual leadership across levels: are the shared purposes in line with the organization's vision; do all values, behaviors, and attitudes fit with the overall organizational culture; are all actions aligned within the organization (e.g., from a resources point of view); is the organization aligned with external pacers. A training program in entrainment management should also include inner life practices on the individual and group level. For example, meditation, prayer, journaling, spending time in nature, yoga and mindfulness are typical individual practices, while voice dialogue, systemic constellation work are examples of inner life practices for teams. But also the practicing of specific behaviors to bring a group into collective entrainment could be included in such a program. For example, expressing a sense of not knowing; speaking with own voice about own truth; expressing shared intent (at the beginning of a meeting); silence to connect with oneself, the other and the environment. The work of Levi (2003) could be used as a basis (see Figure 3.3).

7.3 Critical reflections and limitations

A key assumption on which this dissertation is based, is that entrainment enhances organizational outcomes. Although this assumption is claimed in earlier organizational studies (e.g., Perez-Nordtvedt et al. 2008; Khavul et al. 2010; Shi & Prescott 2012; Dibrell et al. 2015), it would merit a more detailed investigation for two major reasons. First, in each of the studies, entrainment is discussed using one or more of its components (e.g., tempo, phase, timing). There is no consistency in using the same component which makes it difficult to compare and to draw general conclusions. Second, the organizational outcomes in those studies are different in nature, but also context-dependent, either at the organizational or group level. For example, Pérez-Nordtvedt et al. (2008) and Dibrell et al. (2009) consider Return on Assets as their organizational performance indicator, while Khavul et al. (2010) use a compound indicator based on sales growth, profitability, market

share and competitive position. At the team level, Waller (1999) and Woodward et al. (2007) measure team performance through different types of behavior. On the one hand, information collection and transfer, task prioritization, and task distribution is used; on the other hand, task speed and accuracy. These examples show that it is difficult to compare those studies and that the claimed assumptions about entrainment and organizational outcomes are highly context-dependent. Hence, it is recommended that future research specify which entrainment component, organizational performance indicator and research context have been taken into account. In this dissertation, coherence is used consistently as the entrainment variable.

The importance of inner life practices for individuals and an organizational context that fosters such a practice have been highlighted several times in this dissertation. A critique is that inner life has only been measured using the Mindful Attention Awareness Scale (MAAS; Brown & Ryan 2003). Notwithstanding its common use to assess dispositional mindfulness (Tomlinson et al. 2018) and detailed validation (MacKillop & Anderson 2007), other inner life measures have not been considered or investigated. Ample alternatives exist, including the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006), Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al. 2004), Freiburg Mindfulness Inventory (FMI; Walach et al. 2006), Cognitive and Affective Mindfulness Scale—Revised (CAMS-R; Feldman et al. 2007). Other alternatives to estimate inner life could be the Quality of life measured on the World Health Organization Well-Being Index (WHO-5; Topp et al. 2015), or the Positive and Negative Affect Schedule (PANAS; Crawford & Henry 2004).

The impact of socially desirable responding (SDR), or simply *faking*, on the data collection, as well as the timing of the data collection, which could influence SDR, have not been assessed in the empirical studies discussed in this dissertation. Self-report personality tests, such as the Spiritual Leadership Questionnaire, are used on a broad scale despite the fact that an individual's scale score can be invalid due to SDR, or responding to be viewed in a more favourable way (Lambert et al. 2016). Various ways exist to detect SDR. The Marlowe–Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe 1960) and the Balanced Inventory of Desirable Responding (BIDR; Paulhus 1991) are considered the most popular in its kind. However, none of these response bias assessment methods were used in this dissertation.

In addition to the limitations put forward in the previous chapters, this dissertation is subject to other limitations, especially the researcher's bias and lack of previous research studies in this field. Confirmation bias has been a long-recognized phenomenon being an essential piece of thought and behavior and implies the unwitting selectivity and interpretation of evidence in a such a way that it fits the researcher's existing beliefs, expectations, or hypotheses (Nickerson 1998). Although this bias can never be mitigated completely, the following elements attempted to limit its impact. First, the literature review, as discussed in chapter 2, is focusing specifically on published peer-reviewed journal articles, known for their rigorous review procedure. This provided a solid basis for reviewing the relevant literature, even though the selection of articles is subject to the bias of the authors. Categorizing and summarizing the results of several articles per theme, as well as mapping the different types of entrainment and wordings onto an integrated model, were an attempt to limit the confirmation bias. However, reviewing the literature according to the used research methodology could be a future research direction. Second, a detailed description of the methodology for analyzing the empirical data is another attempt to limit confirmation bias and/or to highlight possible risks for bias. It also helps researchers to replicate or conduct similar studies more efficiently. Third, this dissertation made use of existing constructs that have been tested in a variety of situations, limiting the researcher's bias. The positive influence of spiritual leadership theory on organizational outcomes and human well-being has extensively been validated (e.g., Fry et al. 2017; Malone & Fry 2003; Fry, Vitucci & Cedillo 2005; Fry & Matherly 2006). Also, heart rate variability and its relation to coherence and human well-being have been studied for more than 25 years at the HeartMath Instituteⁱ.

The lack of previous research studies in this field, especially combining physiological measures in leadership and organization studies, as discussed in chapter 5, is a limitation and had an impact on the acquisition and analysis of the empirical data. Acquiring data through heart sensors from people in a business environment is challenging. First, it was unclear if the approval of the research design by the medical ethics committees was needed. Because the research dealt with business questions and lies outside the scope of a medical experiment, approval was waived in the end. However, their procedure (from the medical field) to inform participants about the experiment and to obtain their consent is very convenient and was also used. Finding an organization to acquire data was another

ⁱ See www.heartmath.org/research for an overview.

challenge because collecting these data through a heart sensor was seen as highly intrusive and a potential privacy violation. As a result, no suitable organization in a business setting was found for participation in the study which limited the support of the findings. Finally, researching this new field implies the pioneering of a methodological approach. In this dissertation, specific methodological choices were made, but this leaves room for applying other methodologies in future research that could challenge the current findings.

7.4 Suggestions for further research

Although this dissertation has already explored intraentrainment in more detail at the individual level, more empirical research is needed to identify key enablers for intraentrainment in individuals. One way to do this is by verifying the effectiveness of inner life practices, i.e., which practice is more effective than the other, in which situation is this the case, and what are the defining qualities of such a practice. The effectiveness could be measured and compared through the level of heart coherence at the individual level, but also through a compound effect at the group's level. Additionally, at the group level, empirical research could compare the actual performance of teams through the measurement of coherent interaction among the spiritual leadership variables to identify key entrainment enablers of high-performing teams, with or without the support of physiological measures (such as heart coherence). Building further on this design, one could compare the performance before and after an intervention or training (e.g., entrainment management or leadership program).

The learnings and propositions put forward in this dissertation could also advance the understanding of the term *resonant leadership* – a state of being in sync with the people around – as introduced by Goleman, Boyatzis, and McKee (Goleman et al. 2002; Boyatzis & McKee 2005). Moreover, their model for developing resonant leaders through emotional intelligence, vision, and coaching (Boyatzis, Smith, Van Oosten & Woolford 2013) could be an effective method to foster self-entrainment.

How the concept of *flow* relates to entrainment and/or spiritual leadership is another research question in this area that could be explored in more detail. Flow is defined as “a state in which people are so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will continue to do it even at great cost, for the sheer

sake of doing it” (Csikszentmihalyi 1990: 4). Understanding this phenomenon of intrinsically motivated activity led to significant flow research and theory, emphasizing the dynamic system between person and environment, as well as the phenomenology of their interactions. Limited attention was given to develop methods for systematic investigations of these experiences (Nakamura & Csikszentmihalyi 2014). The relation between heart coherence and flow was researched by Mansfield et al. (2012) concluding that coherence can be induced without flow and vice versa, and that these constructs are discrete even though they have similar theories. The concept of entrainment and the research methodologies used in this dissertation might advance the understanding of these experiences and their underlying theory.

There are many ways to advance the theoretical understanding of entrainment in organizations, building further on the propositions put forward in this dissertation. A first way is through elaborating on *interaction intensity*. Interaction is one of the necessary components for entrainment to happen, besides the adjustment of phase and/or tempo between two or more autonomous rhythms. From the literature review (in chapter 2), there is little research on the interaction activity of those rhythms in the process of entrainment. Only Kelly & Barsade (2001) made a note of a curvilinear relationship between synchronicity and affect in groups, hypothesized by Warner et al. (1986). Hence, more empirical research is needed to determine to what extent interaction intensity play an important role in the process of organizational entrainment. Another way to advance this field is to research the potential fractal character in entrainment and spiritual leadership. After all, research of Goldberger et al. (2002) revealed that a healthy heart is a (multi)fractal heart and is related to heart coherence, defined as the adaptive capacity to respond to unpredictable stimuli. More recent studies confirm the existence of such correlations in the measurement of human performance (van Rooij & Van Orden 2011). Other studies have applied the notion of fractals to understand more deeply the multi-dimensionality of building coherent and sustainable network organization (Pavlovich 2009).

Building further on the learnings from the fields of biology and physiology, some additional research questions could be further investigated. Does there exist a specific rhythm for optimal functioning of an organization? Which rhythm (or business cycle) is contributing the most to it, and how can it be established? Similar to craniosacral therapy, is it possible to train leaders to palpate the organizational rhythm for pace, amplitude,

symmetry, and quality to identify where restrictions may exist, and then they apply more subtle methods for releasing them to improve entrainment in organizations?

7.5 References

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Appendix

A Personal Spiritual Leadership Survey (Fry, Rev 4/2018)

1 = Strongly Disagree 2 = Disagree 3 = Neither Agree nor Disagree 4=Agree 5= Strongly Agree

1. I have a personal vision that is clear and compelling to me.
2. I am a kind and considerate person.
3. I feel that those who know me appreciate me.
4. I find it difficult to focus on what's happening in the present.
5. I always give my best efforts.
6. If I could live my life over, I would change almost nothing
7. I feel that I am understood by those closest to me.
8. I have faith in myself and will "do what it takes" to insure that I accomplish my
9. personal goals.
10. I feel that my life has meaning.
11. I talk up my organization to friends as a great place to work.
12. I believe that work quality should always be a high priority.
13. I have a personal vision statement that brings out the best in me.
14. I set challenging goals because I have faith in my success and myself.
15. I feel that I am personally valued by people I interact with on an ongoing basis
16. I have the courage to stand up for what I believe in.
17. I know and can describe my purpose in life.
18. I feel a strong sense of belonging and loyalty to my organization.
19. I maintain an inner life or reflective practice (e.g., spending time in nature, prayer, meditation, reading inspirational literature, yoga, observing religious traditions, writing in a journal).
20. I am satisfied with my life.

21. I am very happy with my organization.
22. I have a mission in life that inspires my best performance.
23. So far I have gotten the important things I want in life.
24. I always do my best because I have faith in myself.
25. I make a difference in other people's lives.
26. I find myself listening to someone with one ear while thinking about or doing something else at the same time.
27. I say what I'll do and do what I say, but if I can't and someone's affected I let them know as soon as possible.
28. I am very efficient in getting maximum output from the resources (money, people, equipment, etc.) I have available.

B Spiritual Leadership Survey (Fry, Rev 1/2018)

1 = Strongly Disagree 2 = Disagree 3 = Neither Agree nor Disagree 4=Agree 5= Strongly Agree

1. The leaders in my organization “walk the walk” as well as “talk the talk.”
2. The work I do makes a difference in people’s lives.
3. I feel my organization appreciates me and my work.
4. I feel like “part of the family” in this organization.
5. I tend not to notice feelings of tension or discomfort until they really grab my attention.
6. The conditions of my life are excellent.
7. I really feel as if my organization’s problems are my own.
8. I have faith in my organization and I am willing to “do whatever it takes” to ensure that it accomplishes its mission.
9. I feel my organization demonstrates respect for me, and my work.
10. The leaders in my organization are honest and without false pride.
11. I would be very happy to spend the rest of my career with this organization.
12. My organization is trustworthy and loyal to its employees.
13. I do jobs or tasks automatically, without being aware of what I’m doing.
14. The work I do is meaningful to me.
15. I persevere and exert extra effort to help my organization succeed because I have faith in what it stands for.
16. I demonstrate my faith in my organization and its mission by doing everything I can do help us succeed.
17. The work I do is very important to me.
18. I understand and am committed to my organization’s vision.
19. In my department, everyone gives his/her best efforts.
20. In my department, work quality is a high priority for all workers.
21. I feel I am valued as a person in my job.
22. The leaders in my organization have the courage to stand up for their people.
23. My job activities are personally meaningful to me.
24. I am satisfied with my life.
25. I find myself listening to someone with one ear while thinking about or doing something else at the same time.

26. My organization has a vision statement that brings out the best in me.
27. In most ways my life is ideal.
28. My organization's vision is clear and compelling to me.
29. My work group is very productive.
30. My organization's vision inspires my best performance.
31. My organization is kind and considerate toward its workers, and when they are suffering, wants to do something about it.
32. I feel highly regarded by my leaders.
33. My work group is very efficient in getting maximum output from the resources.
34. (money, people, equipment, etc.) we have available.
35. I find it difficult to stay focused on what's happening in the present.
36. If I could live my life over, I would change almost nothing.
37. I set challenging goals for my work because I have faith in my organization and want us to succeed.
38. I talk up this organization to my friends as a great place to work for.
39. I could be experiencing some emotion and not be conscious of it until sometime later.
40. I feel a strong sense of belonging to my organization.
41. So far I have gotten the important things I want in life.
42. I find myself doing things without paying attention.
43. I forget a person's name almost as soon as I've been told it for the first time.

C Mindful Attention Awareness Scale (Brown & Ryan 2003)

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

1. I could be experiencing some emotion and not be conscious of it until some time later.
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.
3. I find it difficult to stay focused on what's happening in the present.
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
6. I forget a person's name almost as soon as I've been told it for the first time.
7. It seems I am "running on automatic," without much awareness of what I'm doing.
8. I rush through activities without being really attentive to them.
9. I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.
10. I do jobs or tasks automatically, without being aware of what I'm doing.
11. I find myself listening to someone with one ear, doing something else at the same time.
12. I drive places on 'automatic pilot' and then wonder why I went there.
13. I find myself preoccupied with the future or the past.
14. I find myself doing things without paying attention.
15. I snack without being aware that I'm eating.

D Peer-reviewed publications stemming from this dissertation

Sandra, Danny, and Sharda S. Nandram. 2020. "Driving Organizational Entrainment through Spiritual Leadership." *Journal of Management, Spirituality & Religion* 17 (4): 316–332.

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E Other publications

Nandram, S. S., G. Mourmant, P. K. Bindlish, and D. Sandra. 2019. "Integrating Reason and Intuition: an Integrative approach to Objectivizing Subtle Cues" in *Developing Informed Intuition for Decision Making*. Taylor & Francis LLC.

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