The Pragmatic Nature of Creativity

Exploring the structuring process of expert choreographers

Photo: Gadi Dagan, Batsheva Dance Company performs Sadeh21 at Yerba Buena.

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Written by: Maya Gavish

Supervisory Panel: Prof. Kate Stevens, Dr. Amanda Card & Dr. Scott deLahunta

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MARCS Institute for the Brain, Behaviour and Development

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WESTERN SYDNEY
UNIVERSITY

Statement of Authentication

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution.

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Abstract

To date, empirical studies in choreography mainly focused on the movement generation and manipulation stages. Often, the structuring phase, which entails selection, ordering, and refinement of movement materials, remained untouched. Thus, this empirical study examines the cognitive processes that are associated with structuring and explores how expert choreographers navigate their way through endless possibilities prior to choosing a final dance design.

Building from the assumption that choreographers operate in a manner similar to designers, a model of design heuristics (Yilmaz et al. 2011) was used to frame questions and investigate the transformation of dance structures over time. Generally, changes in the detail level were labeled as 'local strategies' and changes to the overall structure were categorized as 'transitional'. These two groups were divided further based on the type of strategies used by expert choreographers during their creative process. The classification system that emerged enabled the identification of patterns of strategy use, leading toward a better understanding of the structuring process.

Sue Healey and Gideon Obarzanek, the choreographers participating in this study, worked with a group of five dancers and had five days to generate three different dance compositions under several restrictions. They were given the same theme and soundtrack and could only work with movement material that was generated in day one. Moreover, they were asked to incorporate a design strategy during the creation of their second piece, so that its effect on the structuring process could be evaluated. Observations and interviews enabled the extraction of quantitative and qualitative information indicating how many strategies were used per piece, which were used more often, what influenced decision making, which combinations and outcomes were mostly favored by the choreographers, and what the effect was of using an explicit strategy on the structuring process.

I found that choreographers transform their composition through the application of multiple strategies, particularly local ones. Still, each choreographer relies on a particular set of strategies based on the problems they identify in each process and their own personal preferences. Notably, while the use of explicit strategies led to ambiguous results, real innovation was enabled through the application of 'Process Strategies'. These techniques guided the choreographers' overall approach through the solution space by forcing changes in a particular direction. As a result, new dance forms were discovered. Rehearsal time seemed to be a major influence on the structuring process. The more time that was spent on creating a piece, the more alterations were applied. However, having more creation time did not always guarantee a better outcome. In fact, finding the right framework and constraints appeared to be more valuable to the creative process.

1. Introduction

I. Preface

To date, researchers who studied choreography from a cognitive perspective focused on different aspects of the creative process. For some reason, the structuring stage, despite its important role in the composition process, was left unexplored or it was only briefly described. Consequently, the methods choreographers apply for selecting, ordering, and refining movement material into a coherent whole are still not fully acknowledged.

This empirical study aims to fill in the gap through its research method whereby the structuring stage could be investigated in a controlled environment while still emulating a real life scenario as much as possible. The idea is to observe the creative process of two expert choreographers as they create three dance compositions and to extract, compare, and analyze the strategies they use for structuring their dance pieces. The finding from the observations alongside the choreographers' reflections on their own creative process would lead toward a taxonomy of potential strategies that could support other choreographers, especially novices, in creating new works.

In the following section, the latest achievements of studies in choreography and cognition will be explained in more detail, emphasizing how the present study can further contribute to existing knowledge. Later, the research objectives and methods will be discussed, followed by a description of the structure and chapters of this doctorate dissertation.

II. Gap in Research

Interdisciplinary studies in creativity, cognition, and choreography have resulted in a number of projects. These projects can be categorized into three broad research areas: affective, neuro-cognition, and action research (Carlson 2011).

While affective research focuses on the audience's reception of a performance, including the audience's affective reaction (Grove et al.1999-2001, 2002-2005; McKechnie & Stevens, 2009; Popat & Palmer 2004, 2009 from Carlson 2011), neuro-cognition research explores how the brain functions in creative

and physical acts. Some neuro-cognition experiments tested the activity of mirror neurons by imaging which areas in the brain are most activated when observing movement (Calvo-Merino, Glaser, Grezes, Passingham, & Haggard, 2005 from Carlson 2011) whereas others tested how the use of imagery can affect motor response (Jola & Mast, 2005 from Carlson 2011).

Action research is the area that this particular study fits into. This type of research explores the process of creating actions and making decisions as they happen in choreography. Wayne McGregor and his company 'Random Dance' (now called 'Studio Wayne McGregor') have become the main pursuers of this type of research. Working with Scott deLahunta, they have created many works under the observation of cognitive scientists and neuroscientists and have explored processes experienced on a daily basis. They have investigated how dancers view a movement phrase (perception and attention), how dancers learn and perform a dance sequence, and how they generate and develop sequences out of 'phrases' of movement (deLahunta et al. 2009 from Carlson 2011). This project also involved studies that examined dancers' learning patterns, and especially whether they learn best through the use of imagery, physical execution, or 'marking' (Kirsh 2011). Methods such as: showing, making-on, and tasking were evaluated in another study showing which of them allow the choreographer to increase the creative output of the dancers and himself (Kirsh 2009). Davis Kirsh, a cognitive scientist, investigated the methods Wayne McGregor utilizes to generate novel dance phrases. He found that his linguistic and non-linguistic instructions (using sight, touch, and sound) were being translated into movement by stimulating the dancers' imagination, a method he titled 'modality translation'. Another action study brought together robots, engineers, and dancers with the intention of finding a common language between seemingly different disciplines (Popat & Palmer, 2005 from Carlson 2011). The improvisational actions and situated decisions made by the dancer and robot participants were documented along with the thoughts of the engineers (Carlson 2011). Stevens et al. (2009) investigated the choreographic process, including problem finding and solving, metaphorical thinking, non-linear composition, and multi-modal imagery using the 'Geneplore' model of creative cognition. This study focused on the creative process of choreographer Anna Smith, and only touched upon the structuring stage in general. Carlson's (2011) thesis investigated choreographers' decision-making. However, even though her study

explored all three stages of choreography (movement generation, sequencing, and crafting), she mainly focused on a technological tool called Scuddle and its contribution to the choreographic process. The system she used provoked creative decisions by encouraging the choreographers to explore new movement pathways as they followed a visual stimuli on a screen.

The Pact project (Process and Concept Tracking) involved an analysis of Wayne McGregor's creative thinking by cognitive scientist Phil Barnard across six interviews spread between May 2012 and October 2013. The pathway of the choreographer's decisions during the creation of Atomos was highlighted, examining what changed, what ideas came and went, when, how and why. Consequently, "the messy process of artistic creation was revealed" (Jordan 2013, p.3). Still, the PACT methodology explores the use of knowledge and decision making at a rather macroscopic level of analysis, and it relies solely on the choreographer's reports at certain moments in time.

The present interdisciplinary study intends to build upon the legacy of action research by exploring the type of choreographic cognition that is involved in producing a dance-piece, focusing mainly on the structuring phase and the techniques expert choreographers employ as they shape movement materials into larger forms. Interviews will be used with the purpose of exposing the rationale behind their decisions, and in the analysis phase their choices will be compared, exposing similarities and differences in their approach to dance-making. Such study design may lead to a better understanding of the methods expert choreographers employ for producing high quality dance works.

III. **Research Objectives**

1. To gain a better understanding of the structuring process and the methods expert choreographers use for creating dance pieces.

2. To expose the methods choreographers utilize for varying their dance compositions.

3. To examine choreographers' creative processes in an experimental setting whereby structuring can be isolated and examined separately from other stages.

4. To identify similarities and differences in the structuring approach of two expert choreographers

by comparing their creative processes and use of structuring strategies.

5. To expand the knowledge of what is known so far about the unique abilities that expert choreographers possess.

6. To better understand the reasons behind choreographers' decision-making during the structuring phase.

7. To examine whether the use of explicit strategies taken from the field of design can support creativity and problem solving in dance-making.

IV. **Rationale**

In order to achieve these research objectives, I set up a study whereby the structuring phase could be investigated separately from other stages (e.g movement generation). I recruited two expert choreographers and gave both the same task, a structuring problem to solve. Both had five days to create three different dance pieces, each ten minutes long, out of movement material generated in day one. Through observations and interviews, I was able to extract information about the types of strategies used for structuring dance works and for differentiating between them. In addition, as my intention was to find out whether the conscious use of strategies could support the structuring process positively (as opposed to using strategies implicitly or without awareness) and whether choreographic practices could be expanded by integrating design strategies as tools for inventing new dance forms, the participants were presented with another task. They were asked to incorporate a design strategy called 'nesting' (nest two elements within each other) into their second piece and report about their experience with it afterwards.

Notably, even though the plan was to emulate a natural setting as much as possible, as this project included more than one subject, I had to ensure some of its aspects were controlled so that their structuring methods could be compared with minimal biases during the analysis stage. Consequently, both choreographers were given the same space and theme ('polarities')[1] to work with. They collaborated with the exact same number of dancers and were provided with an abstract soundtrack.

[1] The theme 'polarities' was chosen by the researcher. The aim was to provide both choreographers with the same framework so that their structuring process could be compared at the analysis stage with minimal biases. Still, it was important to find a theme that is general enough and which could be interpreted in many ways, so that the artists' creative freedom is not jeopardised.

While at first, these limitations might seem to restrict artistic freedom, they were aimed at stimulating creative thinking, as the participants had to actively search for new ways to structure their pieces while taking into account the different impositions.

During the formal study, data was collected by using video recordings, observations, interviews, and questionnaires. Observations were used for extracting the changes the choreographers applied to their choreography and for tracking the evolution and transformation of the pieces over the five days of the creative process. Interviews targeted information about artistic goals and intentions as well as the rationale behind structuring decisions. All the participants were questioned about their experience with the design strategy, and on the last day the choreographers were asked to select the work they were most satisfied with. In the questionnaires, the dancers shared their impressions of the process and wrote about their own contributions to the creation of the work.

A mixed method analysis was employed for processing the collected data. Overall, every modification to the composition was labeled according to the categories presented in Yilmaz's et al. (2011) model of design heuristics. Changes in the detail level were categorized as local strategies and changes to the overall structure as transitional strategies. Each of these groups were divided further into sub groups based on the type of alteration that took place. Local strategies were broken down into three groups involving manipulations, replacement and layering, while transitional strategies were split into six groups encompassing add/remove, shorten/extend, replace, reshuffle, repeat sections, detach/ merge sections.

This system of sorting data exposed the choreographers' patterns of strategy use, highlighting which techniques were used more often. First, quantitative and qualitative data was analyzed as per subject to show the choreographer's unique structuring approach. However, in the second phase, the data was compared, emphasizing similarities and differences in the participants' practices. Consequently, it was possible to show how expertise supports decision making during the structuring phase, valuable information for those interested in developing their choreographic skills and problem solving in real-time.

V. **Thesis Structure**

The first chapter after the introduction will be the literature review, in which writings in choreography, cognition, creativity and design will be discussed. The aim is to increase the understanding of what is known so far about structuring and the methods experts rely on for solving complex and creative problems such as structuring. Notably, the literature review will be divided into four sections based on the topics that are covered in each one. The first section of the literature review will focus on contemporary choreography and the structuring stage. Contemporary choreography will be defined, followed by a description of the choreographic phases, highlighting the structuring stage and the challenges it entails.

After establishing the idea that choreography is a creative act that requires on-going problem solving, in the second part of the literature review, problem solving will be explained from a cognitive perspective. The particular attributes of creative problem solving will be outlined and described through Sawyer's model of creativity, listing the phases that lead towards creative insights. This section will conclude with the important role conscious and subconscious processes play in problem solving, noting the challenge subconscious processes impose on studying choreographic cognition. A plan for overcoming this obstacle is provided and is brought forward in the research method chapter.

In the third section of the literature review, the unique abilities experts possess will be described, highlighting how their special qualities make them exceptional problem solvers. Maintaining the same line of thought, the factors that contribute to choreographers' decision making will be explained, raising the claim that expert choreographers are better than non-experts at using their experience and knowledge to their advantage, especially when challenging and complex problems emerge. This assertion provides the grounds for studying expert choreographers in this project, as it is their well-developed skills I aim to capture and analyze.

In the last part of the literature review, the similarities between designers and choreographers will be illustrated, justifying the use of a design model to explain transformation in dance compositions. The

three types of strategies designers use for diversifying their work (e.g., local, transitional, and process strategies) will be defined, and their contribution to this study will be noted.

Following the literature review, the research questions will be listed, and the study methodology will be broken down into sections. First, information about the study's participants will be provided, and then the procedures involving data collection and data analysis will be explained.

Results will be presented relative to each research question. However, before comparing the structuring approach of the two choreographers, the findings will be discussed individually for each participant.

This analysis will lead into the final chapter, wherein the main discoveries will be linked with relevant research. Topics such as structuring, strategy use, and influences on the choreographic process will be elaborated and interpreted further prior to reaching final conclusions and summaries.

At the very end of the discussion chapter, implications and future directions will be suggested, the limitations of this study will be indicated, and the main achievements of this project will be highlighted.

Introduction to Literature Review

Contemporary dance and choreography are complex phenomenons with many facets. Their investigation and explanation require the use of theories and tools from many disciplines (Stevens from Grove et al. 2005). The advantages of studying dance from a cognitive perspective have already been acknowledged by various researchers. Dance is viewed as an activity that involves "human perception, action, and cognition" (McKechnie & Stevens from Butterworth & Wildschut 2012 p.48) and therefore, investigating it from the perspective of cognitive science can provide "new accounts of human rationality and consciousness, perceptions, emotions, and desires" with great consequences for our understanding of the creation of artworks (Freeland 2001 from deLahunta et al. 2009 p.3). In the following four chapters, literature in cognition, creativity, choreography, and design is reviewed, focusing on experts and their techniques for solving complex problems. By combining these fields of knowledge, further insights can be gained into the type of cognition involved in structuring contemporary dance pieces.

Chapter 1: Contemporary Choreography and Structuring

In this section, choreography, contemporary choreography, and the phases of the choreographic process will be defined, highlighting the issues choreographers face during their creative process. Structuring will be associated with complex problems, pointing out the gap in literature when it comes to this phase. Hence, this section provides the justification for conducting this study, the aim of which is to investigate the use of strategies by expert choreographers for structuring and varying their dance designs. Studying expert choreographers and the techniques they employ can greatly benefit the dance community, leading to the development of more productive practices and more creative outcomes.

1.1 Choreography & Problem Solving

Choreography is generally defined as the organization or design of movement in time and space (Butterworth & Wildschut 2009). It is also a practice that is highly associated with problem solving (Kirsh, et al 2009, Green 2010, McKechnie & Stevens from Butterworth & Wildschut 2009, Birringer 2008). Indeed, the making of any artwork, dance inclusively, requires posing and answering questions of form, content, style, and technique (Anderson 1986). The only difference is that in choreography the medium is dance and the materials involve the human body and the movements it produces.

During the creative process choreographers deal with conceptual concerns (i.e. What do I dance about?) as well as practical, artistic, or aesthetic concerns (i.e. How do I dance about something?). The choreographic process often starts as a laboratory wherein certain questions are raised, and it progresses as they are investigated (Cvejic 2017). During this time choreographers make choices as to the appropriate forms of representation, constraints, and organization of movement materials (Butterworth & Wildschut 2009). For instance, choreographer Xavier Le Roy began working on his piece '*Self Unfinished*' (1998) by asking the question: How can I not decide what will be seen during the performance? This eventuated in a performance whereby the dancer's body is transformed into a series of images that are reconfigured in a way that is open to multiple interpretations due to their unusual timing, inhuman, or even creature-like quality. By destabilizing the identification of the human body and

its movement, Le Roy creates an illusive performance that can be perceived and interpreted in various ways, allowing the audience to decide for themselves what it is that they see (Cvejic 2017).

Notably, even after finding the right framework and/or concept representation, choreographers still have to deal with countless issues (e.g., functional and aesthetic problems, changing conditions, or originality concerns). Dance creators regularly assess the outcome, identify problems, and transform the composition to achieve their goals (Stevens 2005). Still, choreography is not a straightforward process whereby certain solutions can guarantee a satisfying result, and therefore, it requires experimentation, openness, awareness, and flexibility (Vera & Crossan 2005; Naharin 2000). This raises questions as to how choreographers manage to navigate their way through the sea of possibilities in such an unpredictable process, especially when the pressure to produce a new work is high. In order to find possible answers to this question, I set up a study whereby the creative processes of two expert choreographers could be examined in an experiential setting. The idea was to observe the participants as they created three dance pieces during the course of five days, tracking how their compositions transformed over time, while interviewing the choreographers about their progress. My intention was to reveal the type of logic that guides their choreographic decisions and to expose the commonalities and differences in their approaches to dance-making, leading to a more profound understanding of the structuring process and the structuring tendencies of expert choreographers.

1.2 Contemporary Choreography

In the previous section, I explained the connection between choreography and problem solving. This line of thought will follow through this section as the particular attributes of contemporary choreography and contemporary choreographers will be discussed.

Contemporary choreography developed through a tradition of breaking boundaries. First it pulled away from ballet technique, then it went beyond the narrative structures of ‘modern’ dance, and today it extends post-modern explorations through creative uses of new technologies. In the search for new compositional possibilities, contemporary choreographers engage in experimental and creative practices

that involve generating new dances in a non-deterministic, open way (Carlson 2011). Consequently, they look for the new, surprising, and unexpected as opposed to relying on fixed forms or previous solutions.

Inevitably, contemporary choreographers face a major challenge. They are expected to create work that is imaginative, original, and inspiring while displaying depth of knowledge in terms of the use of content and form to communicate in an artistic and significant way (Smith-Autard 2014, p. 140). However, producing work that is both novel and of high quality (beautiful, interesting, and absorbing), is a balance that is hard to achieve. This is because "it is easier to be novel if one's work need not meet existing norms of quality; it is easier to produce recognizably high quality work if one's work need not be novel" (Kirsh 2009).

David Kirsh (2009), a cognitive psychologist who studies dance and choreography, states that "great choreographers are noteworthy because they…. can ensure that even their most novel, risky pieces meet a certain acceptable level of recognizable quality, and even their most safe pieces meet a certain acceptable level of novelty" (Kirsh 2009). These special abilities expert choreographers possess are the main interest of the present study and the main reason I chose to explore structuring from the point of view of highly experienced practitioners. By analyzing the creative process of expert choreographers, I aspire to reveal the strategies they use for creating work that is both innovative and of high quality.

1.3 Models of Choreographic Phases

So far, the relationship between choreography and problem solving, and between contemporary choreography and creativity has been established. Choreographers regularly assess their work, identify problems, and modify the composition in order to achieve their goals. This means both the content and structure of the piece continue to develop and evolve during the rehearsal period and sometimes even after the first performance. Notably, while most choreographic processes involve the same procedures, each process unfolds differently based on the situation at hand. Various models describe the choreographic process and its phases. Some are more general and others more specific (Butterworth 2004; Lavender & Predock-Linnel, 2001; Mason, 2012; Abbs 1989). Butterworth's (2009) model is quite detailed, breaking the choreographic process into eight stages encompassing: Stimulus/Conception/

Intention; Dance Content: the generation of language; Process: the modes of making; Dance Content Development; Structuring: macro and micro; Completion/Rehearsal; Performance(s); Evaluation/ Reflection. Her framework refers to structuring; the phase that is explored in the current study, and this is why it is described here.

According to Butterworth (2009) every choreographic process involves the following phases:

A. Stimulus/Conception/Intention: in this stage the aim, context, and concept of the piece become clear and initial starting points are determined.

B. Dance Content: the generation of language; generating or re-working movement material. This could be task based, working with improvisation or set material.

C. Process: operating within different modes of creation. It could be a more didactic approach where the roles of the choreographer and dancers are hierarchical and clearly defined (dancers as instruments) or democratic (Facilitator-creator or all being co-owners). The type of approach determines who makes the decisions and how collaborative the process is. In a didactic process the choreographer will make most of the artistic decisions. However, in a democratic process the creative responsibility will be shared more equally between group members.

D. Dance Content Development: the shaping of material and expressive details. Here choreographic devices are used, such as motif or phrase development, making additions and/or manipulations that involve modifying the use of time, space, and dynamics.

E. Structuring: where the structure of the piece is being considered both on a macro and micro level (This stage will be further explained in the next section).

F. Completion/Rehearsal: interpretation and coherence of all the included elements in the choreography.

G. Performance(s).

H. Evaluation/Reflection: consciously evaluating the process and product.

Butterworth (2009) states that even though the eight phases are listed in a certain order, in reality the order may change. The order of the eight phases could differ from one choreographer to another and

between different choreographic processes. For example, the piece's structure could be realized towards the end of the creation in one project, and in another, it could be determined even before the creative process commences. Sometimes it can be discovered as the piece progresses, and at other times it could be improvised in the moment of the performance. Choreographers engage in a continual dialogue with their work. They may go back and revisit earlier stages in order to explore more options. They may generate new movement material even if they have reached the stage where they are structuring their piece. This back and forth movement results in a process that is very recursive and dynamic (Butterworth 2009).

The aims of the present research and the fact that choreography entails many phases that do not occur chronologically called for a particular study design whereby the structuring phase could be explored in isolation from other phases. To do so, multiple experimental methods were considered. All in all, the study's participants had only one day to generate movement material based on a given theme ('polarities') and four days to shape it into three different dance pieces. Once the movement generation phase was completed the choreographers could focus on structuring, and the researcher was able to extract information about the techniques they applied while doing so. Any change the subjects made to their compositions was noted and discussed, with the purpose of exposing the logic behind their choreographic decisions. Learning about choreography from accomplished artists can greatly benefit those who would like to develop their own choreographic skills and enhance their creativity and productivity.

1.4 The Challenges Structuring Entails

"Dance is a language that combines the most abstract ideas and gives them concreteness" (De Keersmaeker 2011).

In the previous sections the nature of choreography was discussed, relating both practices to problem solving. When creating a dance piece, choreographers go through different phases. They go back and forth between them and resolve a variety of problems before arriving at a final outcome. Notably, every phase entails its own concerns. However, here I argue that the structuring stage is particularly problematic, since during this stage choreographers consider many variables and negotiate how they

could possibly work together to communicate an intention clearly. Below I explain structuring in more detail and review the challenges and complexities it involves.

Structuring is the phase in which movements or movement sequences are being selected, ordered, and refined to create work that has a clear beginning, middle, and end. In this stage, choreographers give the piece its form, which embodies its underlying concept. The word “form” is used in all arts to describe the system, internal logic, order, and coherency through which each work of art exists (Smith- Autard 2000). Form grows with and supports an idea, combining the medium, message, and format. It includes both the movement material as well as the piece's overall structure. Structuring explores the higher-level organization of time, space, pattern, and performance that connects a choreographic piece to any implied meaning or expression. Structuring allows the audience to appreciate the way all the pieces of the puzzle fit, its completeness and unity (Blom & Chaplin 1989).

When structuring a dance, the work is assessed both on the macro and micro level. On the macro level choreographers consider how different parts relate to the whole, and on the micro level they search for a particular logical structure of smaller parts (Smith-Autard 2000). Communicating mood, expression, and images clearly is an important aspect of this stage, as well as ensuring qualities such as unity, contrast, and variety. To do so, choreographers think of ways to balance the length, shape, and intensity of movement sections. They monitor the transition between them and decide which materials to repeat, manipulate, juxtapose, or layer (Smith-Autard 2000). At the same time, the relationship between the composition and musical score is considered (Butterworth 2012) alongside other production elements such as lighting, costumes, props, and stage design.

Notably, even though there are existing known models of dance structures (e.g., rondo, narrative, collage, suite, theme, and variations), contemporary choreographers will deliberately search for new structures and experiment with their functional possibilities for the purpose of discovering new paths to dance-making (Blom & Chaplin 1982) and with the intention of finding frameworks to better suit their piece’s concept and artistic vision (Butterworth 2012). Still, renowned choreographers such as William Forsythe claim that finding the right framework is the biggest challenge of choreography (Just Dancing Around 2007).

Surprisingly, despite its crucial role in crafting successful dance works, structuring is one of the least codified or defined aspect of choreography. While there are many techniques for generating and exploring movement, there are fewer codified methods for piecing a choreographic work together (Carlson 2011). Consequently, choreographers are left to find their own way through the sea of possibilities (Butterworth & Wildschut 2009, p. 140). This is why in the current study I have decided to probe the workings of expert choreographers with the purpose of extracting and analyzing the methods they employ for structuring and diversifying their dance pieces.

Dealing with complex problems such as structuring often result in a high level of cognitive load, and therefore it requires well-tuned problem solving skills. Cognitive load refers to the total amount of mental effort being used in the working memory that is related to the inherent level of difficulty associated with a specific problem (Sweller & Chandler 1991). Apparently, experience helps to design actions intelligently towards the execution of a plan (Carlson 2011). This is why in this study the actions of choreographers with over 30 years of experience in creating dance works will be analyzed. The aims are to explore the techniques expert choreographers use as they tackle the complex problem of structuring and to investigate how they manage to remain productive and innovative despite being subjected to time pressure and other constraints.

Chapter 2: Problem Solving, Creativity, and Choreography

In the previous section, I established the notion that choreography is a creative act that requires ongoing problem solving. Structuring was found to be the most complex and challenging phase within the choreographic process, and yet it is the least explored and understood. In order to gain better insight into the choreographic cognition[2] that is involved in structuring dance pieces, in this section literature in cognitive psychology and creativity will be reviewed. The aim is to explore what is known so far about the mental processes that are involved in problem solving, and in particular in dealing with problems that resemble structuring in nature (e.g., ill-defined problems). Subsequently, the specific attributes of creative problem solving will be outlined and described through Sawyer's model of creativity, wherein he lists the phases leading towards creative insights. This section will conclude with the important role that conscious and subconscious processes play in creative problem solving, noting the challenges that subconscious processes impose on studying choreographic cognition. A plan for overcoming this obstacle is proposed.

2.1 Problem Solving

When creating a dance piece, choreographers regularly face a series of problems that need to be resolved (Carlson 2011), with structuring being the stage in which choreographers make important editorial decisions relating to the overall design of the piece. While not much is known about the type of cognition that is involved in structuring, problem solving has been studied by cognitive psychologists since the 1970s (Newell and Simon 1972). Learning about choreography from a cognitive perspective can enhance the understanding of what occurs in the minds of choreographers throughout the creative process, and particularly during the structuring stage. In the following paragraphs different theories concerning problem solving will be discussed, relating these to the choreographic process and to the design of this current study.

Problem solving is generally defined as "any goal-directed sequence of cognitive operations" (Anderson

[2] "Choreographic cognition refers to the cognitive and mental processes involved in constructing and refining movement material with the intention of creating a work of art" (Stevens & Glass, 2005).

1980, p. 257). Theories appearing in cognitive psychology literature have proposed that people solve problems by searching in a problem space. The problem space consists of the initial (current) state, the goal state, and all possible states in between. The actions that individuals take in order to move from one state to another are known as 'operators'. People may want to unravel a problem which can be tangible (finding car keys) or abstract (mathematical proof). This may involve physical actions (reaching, writing), perceptual activities (looking, listening), and/or mental activities like remembering (Newell & Simon 1972). In the present study, the aim was to examine the type of 'operations' expert choreographers pursue as they solve a choreographic problem given to them by the researcher, extracting the strategies they apply for structuring and varying their dance pieces.

Overall, when individuals are presented with a problem they frame it by first constructing a mental representation or mental model of the problem (Newell & Simon 1972). Still, the way problems are represented can differ greatly depending on the context and the modality the solvers rely on. Each person constructs a problem space that includes what they identify as the relevant information from the context in which a problem is embedded (Jonassen 2000). This means that even when presented with the same problem, people may come up with a variety of solutions due to different internal and external factors (i.e. individual and contextual differences). Based on this information I had to ensure the choreographers participating in the study work under similar conditions, minimising the affect external elements may have on their choreographic choices. By regulating their use of: space, theme, music, number of dancers, and rehearsal time, I could compare their structuring approach with minimal biases during the analysis stage. Additionally, I used interviews as tools for extracting information about the factors the choreographers considered during the creative process, relating these with their structuring choices.

Another important aspect that affected the research methodology was the idea that problem representation can be distributed over internal and external structures. That means that internal problem spaces can be externalized as formal models using a variety of cultivated representation tools (Jonassen, 2000c). According to Kirsh (2009), individuals tend to use external representations in order to keep track of their activity. This is especially true when it comes to choreography. Dealing with an art form that is temporal, ephemeral, and very detailed, choreographers are left with no other choice but to give their

thoughts a physical form. They progress by creating a movement sequence, a sketch, or a plan and refine it gradually. The idea that thoughts can be externalized is of great benefit to this study, as it means choreographic cognition can be explored by observing and analyzing the evolution of a particular dance.

In the article *'Toward a design theory of problem solving',* Jonassen (2000) argues that problem solving requires some activity-based manipulation of the problem space. The reason is that by engaging in an activity, meaning could be constructed, so there is reciprocal regulatory feedback between knowledge and activity (Fishbein et al. 1990). In choreography, there are no guaranteed solutions, and therefore ideas are often tested, evaluated, and modified until a suitable option is found. The choreographers' gradual shaping and refining of the composition is the core interest of this study, and so, by using observations and interviews I intend to capture not only what expert choreographers do as they structure their pieces, but also document the reasons behind their actions.

2.2 Structuring is a Complex and Ill-Defined Problem

In the previous section I described how cognitive theories about problem solving relate to the choreographic practice and how they affected the design of this present study. However, in this section the idea that problem solving is not a uniform activity will be emphasized. Aligned with the argument that problems are not equivalent in content, form, process, or complexity (Jonassen 2000), structuring will be associated with a specific group of problems (complex and ill-defined) that require a particular problem-solving approach.

Structuring could be considered a complex problem as it is concerned with many components that are processed in a dynamic environment in which the composition is constantly evolving and transforming (English 1998). Complex problems are considered more difficult (English, 1998), as they place a heavier burden on working memory. This is due to the large number of factors that are accounted for during problem structuring and solution generation (Jonassen 2000), which require the involvement of more cognitive operations (Kluwe 1995).

What renders structuring even more challenging is its ill-defined nature; in fact most artistic activities are ill-defined (composing music, writing a story, painting a picture). In such problems, the specifications of

goals are often ambiguous. There is no determined path to solutions. Ends and means are not as clearly defined, and there could be many possible solutions (Kitchner 1983). In dance-making, intentions may shift according to the circumstances that present themselves, and they may also be discovered during the process rather than determined in advance (Pake from Butterworth & Wildschut 2009). It is almost impossible to know at the beginning what will be the best option to pursue because there are many choreographic possibilities, and it is also impossible to predict in advance where the creative journey may lead or which obstacles may emerge. This inability to fully foresee what a dance could become makes the choreographic process a matter of discovery, as Israeli choreographer, Emanuel Gat, explains:

> I have no wish to control or plan. I'm concentrating on understanding the forces that generate form, actions, dynamics, rhythms, and textures. It is more about discovering the way it will eventually look and sound rather than trying to imagine it beforehand…Basically I switch the machine ON and wait for it to do its thing…it's about understanding the delicate balance between discovering and inventing, and how structures which are the result of a discovery process hold much more than the ones we invent. (Gat from Hutera 2011)

What Gat describes here is his own philosophy for tackling the problem of choreography. Still, this particular quote does not tell us much about the more specific methods he applies for creating his pieces. Previous studies found that solvers of ill-defined problems tend to focus more on generating satisfactory solutions as opposed to focusing on problem analysis; they construct personalized systems for evaluating their products, and they are more inclined to divide the problem into a set of meaningful tasks (Jonassen 2000). These findings have never been tested or verified within the context of choreography. Therefore, in this present study the main goal is to explore the types of operations choreographers undergo during the structuring stage, exposing their tendencies as they deal with the ill-defined and complex nature of choreography. Becoming aware of the strategies expert choreographers use may support other practitioners who wish to enhance the productivity, efficiency, and creativity of their own processes.

2.3 Choreographic Operations

So far, the connection between choreography and problem solving has been demonstrated, explaining why choreography could be associated with problems that are complex and ill-defined. In this section,

though, the focus will be on the relation between strategic thinking and problem solving, arguing that choreographers rely on domain-specific strategies for solving the choreographic problems they encounter during their creative process.

Models such as IDEAL (Bransford & Stein 1984) link problem solving with the use of strategies, suggesting that solvers tend to explore possible strategies, before implementing them, and evaluating the outcomes (Jonassen 2000). Still, it is important to remember that problem solving is not a uniform process. This is because each domain involves its own activities and context specifications. Problem solving skills are situated and embedded, and therefore dependent on the nature of the context or field of practice. This means that solving problems within a domain relies on cognitive operations that are specific to that field of practice (Mayer 1992; Smith 1991; Sternberg & Frensch 1991). These operations are often referred to as 'strong methods', as opposed to domain-general strategies that can be applied across many domains and therefore considered to be weak methods (Singley & Anderson 1989). Experts in different domains develop reasoning skills through solving situated, ill-structured problems that require forms of logic that are domain-specific. They are better problem solvers because they use more effective problem-solving strategies (Mayer & Wittrock, 1996). Experience helps to design actions intelligently towards the execution of a plan and to prioritize actions (Carlson 2011). For these reasons I chose to study expert choreographers and the strategies they employ for structuring and varying their dance compositions.

Notably, strategizing in choreography could be a matter of planning or the result of improvisatory actions. While plans are predetermined, improvisatory actions are constantly constructed and reconstructed from dynamic interactions with the environment and its prevailing conditions (Carlson 2011, p.41). Plans can play a key role in solving ill-defined problems, since by setting goals and constraints, choreographers define the path to creating a dance piece. Still, obstacles and new directions adjust the creative process. Artistic challenges emerge in unique patterns and have different characters in each artistic venture (Lavender 2009). Consequently, dance-makers must have responsive thinking and quick actions in order to continually progress. Choreographers regularly make unprecedented decisions which adjust the work process and final result (Nardi, 1995; Suchman, 1987, from Carlson 2011). For

example, they can experiment with techniques such as cutting and pasting or try out alternative versions of movement material.

Investigating the domain-specific strategies expert choreographers use for structuring and varying their pieces required a particular research method. In this present study, interviews and observations were utilized for capturing both the plans and improvised actions of two expert choreographers as they constructed three dance pieces. The participants were questioned daily about their plans, goals, and intentions, and their actions were noted, documenting how they changed their composition over time. This way I could gain insight into the cognition involved in the choreographic process, uncovering how experts manage to achieve their goals despite many constraints and obstacles. Such information could be useful for other practitioners who deal with unpredictable and uncertain situations and for novices who strive to further develop their artistic skills.

2.4 Summary

In this part of the literature review, the structuring process was related with ill-defined and complex problems. I argued that choreographers rely on domain-specific strategies in order to achieve their goals, and demonstrated how their strategic choices could differ due to internal and external factors. I explained why investigating choreographic cognition and structuring required a particular research method, and described in short how the study was executed.

In the following chapters, I will discuss in more detail the factors that influence problem solving, and I will also delve deeper into the role strategic knowledge plays in the choreographic practice. However, first the unique characteristics of creative problem solving will be explored, illustrating how theories in creativity affected the design of this study.

2.5 Creative Problem Solving (CPS)

"Choreography is the art of building dances, and the choreographer is the architect. Creativity figures strongly in this building process- the more creative, inventive and flexible the choreographer, the more versatile the dance" (McGreevy-Nichols & Scheff 1995).

Contemporary choreographers are expected to produce an outcome that is innovative, original, and also socially valuable. Therefore, based on Csikszentmihalyi's (2013) definition of creativity, their practice could be considered a creative activity. The process whereby humans search for an original and previously unknown solution to a problem is defined as creative problem-solving (Creativity & Innovation 2017). In this section, the cognition involved in CPS will be described, focusing on the role creativity plays in the choreographic process.

2.5.1 Phases in CPS

Different psychologists have argued that creativity tends to develop in a sequence of phases (Wallas 1926; Bransford & Stein 1984; Isaksen et al. 2000; Sternberg 2006). The simplest model of the creative process is named the 'balloon', an expansion of divergent (open-ended) thinking followed by convergent thinking (analytical thinking) as you converge on the one best idea. Divergent or associative thought is the ability to produce unusual ideas; expanding the range of possible solutions from which to choose (Ward et al. 1997). Convergent thinking, on the other hand, means the solver selects the best idea by creating correlations between unrelated items (Ward et al. 1997). Still, the selected ideas are only considered creative if they are innovative, original, and novel (Boden 1998). In terms of structuring, divergent thinking could be reflected through the number of aspirant designs choreographers produce during the process, and convergent thinking is the one design they choose to eventually pursue. Interestingly, divergent thinking has often been associated with creative performance and achievement (Plucker 1999; Wechsler 2006) and has been considered to be a better predictor of creativity even when intelligence and expertise have been taken into account (Vincent et al.2001). Still, theorists over the past 20 years have moved towards more inclusive models of creativity in which divergent thinking plays an important but small role (Plucker et al 2004 from Sawyer 2006). In his book 'Explaining Creativity' Sawyer (2006) proposed a framework that captures the key stages of the various models that psychologists have proposed. His integrated framework describes eight stages of the creative process: problem finding and formulating, knowledge acquisition (expertise, mastery, and practice), information

gathering, incubation, generating a large variety of ideas, combining ideas in unexpected ways, and selecting the best ideas. These stages can be used to explain how choreographers arrive at creative insights and solutions that enable the construction of original compositions.

2.5.2 Sawyer's Model of Creativity

Sawyer's eight stages model of creativity is domain-general and therefore it can capture the cognitive processes involved in any creative act. While the stages are organized in a certain order, in reality, creativity emerges over time in a complex non-linear fashion. That means that mental processes can overlap, cycle repeatedly, or appear in reverse order. For instance, it is very common to experience several mini-insights before arriving at a final resolution (Sawyer 2006). Complex processes, such as choreography, could not be resolved with a single revelation. They are often divided into parts and involve a serious of mini insights with incubation occurring throughout (Arieti 1976 from Sawyer 2006). This is why creativity researchers agree that creativity takes time (Tradif et al. 1988 from Sawyer 2006). The effect of rehearsing time on the choreographic process will be described in the following paragraphs alongside other elements that influenced and informed the study design.

- **Problem-Finding**

Sawyer (2006) explains that the first step in solving ill-defined problems is to identify and formulate the problem in such a way that it will be more likely to lead to a creative solution. The importance of finding good problems has been recognized for quite some time, and it is associated with exceptional creativity (Sawyer 2006). Even Albert Einstein believed that "the formulation of a problem is often more essential than its solution" (Einstein & Infeld 1938, p. 83 from Sawyer 2006). Sawyer argues that problem finding is important because it sets the foundation for the search space which includes the acquisition of knowledge, the generation of multiple ideas, and the selection of the best idea. Csikszentmihalyi and Getzels (1970, 1971) initiated the empirical work on problem finding (cf. Patrick, 1935, 1937) and studied the activities of art students. They found that the exploratory behaviours of the artists before they actually worked were predictive of the quality of the eventual artwork. Later on, Kay (1991, 1994)

replicated this finding with several groups of professional and semi-professional artists (Runco 1993 from Sawyer 2006).

Sawyer (2006) states that recognizing good problems and asking the right questions requires experience, knowledge, and training (p.65). Cross (2004), who studied expert designers, found that they select features of the problem space to which they choose to attend (naming) and identify areas of the solution space in which they choose to explore (framing). He explains that formulating a design problem is done through: setting boundaries, selecting particular things and relations to focus on, and identifying coherence that will guide subsequent moves. Seeing the design situation in a certain way (the 'designer's problem paradigm') and defining its 'guiding themes', principles, or 'generators' highly influences the creative process. Cross argues that "processes of structuring and formulating the problem are frequently identified as key features of design expertise". According to him, "outstanding designers are found in various studies to be pro-active in problem framing, actively imposing their view of the problem and directing the search for solution conjectures" (p.11).

Notably, instances of problem finding and framing by choreographers are well-documented in dance literature (Cvejic 2010, Stevens 2005, Protopapa 2015). Recently, Cvejic (2017), a performance theorist, published a book titled 'Choreographing Problems'. The book is dedicated to analyzing seven works she selected based on what she describes as "striking specimens of problem posing" (p.1). The choreographers she focused on were motivated by the desire to break away from conventional performance modes by asking questions that destabilize known forms of practices. For example, when working on his piece *Self-Unfinished,* choreographer Xavier le Roy asked the question "How can I not decide what is it to be seen?". As a result, his creation process was driven by an attempt to prevent audiences from reading metaphors into his choreography. His solution was to form a piece wherein he keeps shifting between different non-human body configurations that never establish themselves long enough to become recognizable images. As such, the spectators were challenged to think about what the "monstrous body" in front of them was representing, while accepting that no answer was forthcoming.

The last example demonstrates how problem finding can give rise to propositions and solutions. It entails experimentation and provides an opportunity to contribute to more differentiated and heterogeneous

expressions of the body, movement, and duration (Cvejic 2017). Knowing that problem finding and formulating has such an important effect on the choreographic process and outcomes has led to the realization that in order to better understand the decisions choreographers make during their process, their motivations and intentions should be fully understood. Consequently, in this study daily interviews were used to capture the choreographers' thinking process so that their personal way of framing their process could be linked with their structuring choices.

- **Acquiring Knowledge**

Creativity builds from mastery, practice, and expertise. Acquiring knowledge depends on two aspects: one, internalizing knowledge about a certain domain over a long period of time (often associated with exceptional creativity) and two, learning everything relevant to the problem. Through the latter, solvers inspect prior works and conventions and generate new creative combinations (Sawyer 2012, p.93). In this present study, the decision was made to learn about structuring from observing the creative process of expert choreographers, extracting the strategies they use for constructing their dance works. The assumption was that due to their vast experience and knowledge, their methods are worth exploring. Moreover, daily interviews exposed what factors influenced structuring decisions, from which it was possible to discern which information the choreographers took into account while structuring their piece.

- **Gather Related Information**

Creativity results from alert awareness of unexpected and apparently unrelated information in the environment and the absorption of information from a wide range of sources. According to Sawyer, creative thought is associated with a perception that is active and alert to opportunities which are relevant to the problem, linking new information with existing problems and tasks. Notably, creativity depends on being critical and evaluative when deciding which information to look for (Mumford et al. 2003 from Sawyer 2006). Exceptional creators use special techniques to notice what is around them more effectively and more efficiently. They are better at perceiving gaps, spotting difficulties, and noticing opportunities and flaws (Perkins 1981 from Sawyer 2006). Obviously, what choreographers perceive and become aware of during their creative process affects their decision making. However, it is

what expert choreographers purposefully direct their attention to that I aimed to uncover in the present study. As a result, the choreographers' statements and actions were recorded and analyzed, using them as indicators of the choreographers' focus and attention.

- **Incubation**

Once relevant knowledge and some amount of unrelated information are acquired, the unconscious mind processes and associates that information in unpredictable and surprising ways. Ideas and thoughts are then combined in an undirected manner. Interestingly, exceptional creators have reported that their best ideas emerged from an unguided, unconscious process. The incubation stage involves giving the mind the time to process information, to search for new and appropriate combinations and creative solutions to the problem. In fact, the bulk of experimental evidence supports an incubation effect whereby working on an unrelated task increases solution rates for creativity-related problems. Giving the mind a rest provides the opportunity to become less fixated on incorrect solutions, and it also allows for spreading activation in the unconscious mind. In addition, taking time off provides opportunities to encounter a stimulus that is related to the problem. These accounts are supported by different studies that identified a positive incubation effect on problem solving (Sio 2009 from Sawyer 2006). One of these studies by Tsenn et al. (2014) showed that incubation generates a greater quantity of ideas, while extended time aids in high quality and novelty. Dance theorists seem to also agree that less time pressure and an extended rehearsal time allows for more gestation and incubation (Butterworth & Wildschut 2009). They argue that periods of unconscious work are helpful in testing and understanding different aspects of the work while allowing new ideas to spring forth, especially in moments of blockage and fixation. Through incubation individuals may gain a new perspective and renewed creativity (Minton 2007) and thus, it has a special role in finding novel solutions (Gilhooly 2016), forms, and structures. Becoming aware of the effects that time and time away have on people's problem solving and creativity influenced this study design in that, during the analysis stage qualitative and quantitative data, extracted from the study was used to examine the relations between rehearsing time, the choreographic process, and outcomes. The amount of time the choreographers spent on each piece was compared with the amount of changes they applied, together with the choreographers' level of satisfaction with the final outcome. This way it was

possible to determine whether having more rehearsal time led to exploring more compositional options, which in return increased their level of appreciation of the final result.

- **Generating Ideas**

The generation of potential solutions to the problem can occur unconsciously, but also while consciously paying attention to the problem. For instance, theorists of Associationism claim that sudden insights are the result of gathering a lot of information, making connections between facts, and combining existing ideas. Interestingly, the generation of many ideas seems to be one of the primary components of the creative process (Runco & Chand 1995), as many theorists believe that the quantity of ideas breeds quality. As Osborn (1963) argues, the greater number of ideas generated, the greater the chance of producing a radical and effective solution or an outcome that is "distinguishable from the rest, representing novel concepts" (Yilmaz 2011, p.404). The last statement was tested in this study with respect to structuring. The purpose was to find out whether expert choreographers believe a higher number of candidate designs eventually lead to a better outcome. The choreographers participating in the present study were asked to disclose which dance piece out of the three they had created was their favourite and explain why they selected this particular work. Their answer was then compared with the number of changes they made to the composition throughout the five days of the study, uncovering whether their choice involved the piece with the highest number of changes or not. Understanding the relationship between the quantity of ideas and quality of outcomes in the context of structuring could become valuable information for practitioners who wish to plan their process in a way that will allow them to produce the best results.

- **Combining Ideas**

Associationist theorists believe that creativity occurs when existing ideas combine together in unexpected ways. Some even argue that working on multiple projects or internalizing multiple domains can increase the pool of basic ideas (cross-fertilization) by generating interesting new combinations (Simonton 1988 from Sawyer 2006). Analogy plays a large part in "combinatorial" and "impossible" creativity as it allows us to perceive things in a new way. We can associate similar ideas or recognize

more distant analogies. However, the more different the concepts are, the more novel and innovative the combinations become (Boden 1995). Boden (1995) argues that many ideas we regard as creative are indeed based, at least in part, on unusual combinations. She claims that "novel combinations" have to be not only new, but interesting, creative, and valuable: ”Many creative ideas are surprising not because they involve some unusual mix of familiar ideas, but in a deeper way they concern novel ideas which not only did not happen before, but which in a sense could not have happened before”. In the fourth section of the literature review, I discuss a method titled synthesizing that is commonly used by designers and choreographers alike. This technique allows for exploring novel designs (and structures) by merging different concepts. During this study, daily interviews and observations enabled capturing incidents wherein synthesizing was employed by the choreographers. The participants applied this strategy to create new forms of organization by mixing old and new ideas. By doing so, they were able to create three different dance pieces despite the restrictions imposed on them (using the same movement material, theme, and music). This has led to the conclusion that synthesizing is valuable to choreographers’ creativity and innovation.

- **Selecting the Best Ideas**

The creative process typically results in a large number of potential solutions. Thus, creators must select the most effective solutions to pursue further. After a few insights or combination emerge, they are often evaluated as the creator is trying to select the best option. This convergent stage is fully conscious as the creator draws on domain knowledge. Evaluation and revision contribute to creativity by leading to greater originality and impact (Lonergan et al. from Sawyer 2006). Different studies acknowledge that creativity is enhanced by a close relationship between divergent and convergent thinking, suggesting that creative people are good at critically evaluating their many ideas and selecting their best one (Sawyer 2006). Within the context of choreography, it is important to understand which factors expert choreographers consider when it comes to selecting one structure over the other. Consequently, the choreographers participating in the study were asked to describe which version out of the three they created they were most satisfied with, exposing which ideas contributed to the best outcome. Their explanations gave further insight into the elements that make a good artwork.

- **Externalizing the Idea**

Successful creators are skilled at: executing their ideas, predicting how others might react to them, identifying the necessary resources to make them successful, forming plans for implementing the ideas, and improvising in order to adjust plans as new information arrives. This final stage is mostly conscious. It is when the creator moulds a raw insight into a complete product. Most insights are not fully formed, hence the creators have to use their domain knowledge to convert the idea into a finished work. Making the idea reality involves skill, craftsmanship, dedication, and creativity, as externalizing ideas generates even more ideas and problem finding. Externalizing does not have to happen last. In fact, it could be used throughout the process. Exceptional creators often generate and externalize pre-inventive structures – ambiguous, preliminary, or prototype versions of an idea that can be interpreted in many ways. Creators experience a cycle of mini-insights and revisions, elaborating each one of them into a finished work (Fink et al. 1992 from Sawyer 2006). In this current study the idea was to track the creative process of two expert choreographers as they generate three dance works, tracking the changes their compositions undergo from the moment a preliminary structure is formed to the moment of completion. The structuring strategies applied by each participant were extracted and grouped based on their characteristics, exposing similarities and differences in the choreographers' structuring style.

2.5.3 Sawyer's Model and Research Methods

Sawyer's model of CPS was taken into consideration during the development of the study design, and not only provided the criteria for choosing the right participants, but also affected the planning of the proposed task, data collection methods, and analysis.

To begin with, this study's aim was to understand the structuring process from the experts' point of view. Therefore, the choreographers who were recruited for this study had to demonstrate vast experience in dance-making. Working as choreographers for over 30 years, both participants acquired extensive knowledge in the art of dance and choreography, and thus, the daily interviews and observations captured how they utilized their expertise when creating dance works.

The task the participants were presented with was designed to stimulate creative thinking, encouraging the participants to actively look for creative and original solutions. The participants were asked to form three different dance pieces out of movement material they had generated in day one using the same music, time frame, and theme. At the same time, the researcher observed and documented the entire process, extracting the strategies the choreographers used for structuring and varying their dance pieces.

Daily interviews captured the choreographers' understanding of the task and the daily process. The participants were asked to explain their choreographic choices, exposing their critical thinking and evaluative skills. At the end of the process, both choreographers were asked to disclose which of the pieces they were most satisfied with, unraveling which elements support the creation of a successful piece.

Notably, Sawyer's model has highlighted a few topics that require closer attention, as they directly impact this study. In the following sections, I will look into the role conscious and sub-conscious processes play in problem solving and investigate the impact expertise has on decision making. In the third chapter of the literature review, other aspects that were not mentioned in Sawyer's model will be discussed. Contemporary choreography challenges cognitive perspectives because it is a highly embodied activity and a very involved social practice. In choreography, one cannot separate mental processes from bodily expressions and actions, and one cannot ignore influences from interactions with other collaborators and the surroundings (Kirsh 2010; Stevens et al. 2003). In section 3.2, a model by Carlson (2011) will give a more inclusive view of the factors contributing to choreographic decision making as it relates to the mind, body, and environment in which choreographers work. This model will be used to expand upon Sawyer's framework and draw a fuller perspective of the processes involved in dance-making.

2.6 Explicit Implicit Interaction (EII)

The eight stages described in Sawyer's model sometimes involve conscious work and other times subconscious work. For instance, the first three stages are predominantly conscious and directed. However, the fourth, incubation, is subconscious. Similarly, the Explicit–Implicit Interaction (EII) theory

suggests that CPS involves shifting between implicit and explicit types of thought, and that these two processes are simultaneously involved in most daily tasks (Helie & Sun 2010). This theory inspired the development of process-based models of creativity encompassing incubation, insight, and other related phenomena. Implicit cognition refers to unconscious influences such as knowledge, perception, or memory, which impact an individual's behaviour and creativity (Reingold and Ray 2006). On the other hand, explicit knowledge is knowledge that can be readily articulated, codified, accessed, verbalized, and easily transmitted to others (Helie and Sun 2010). The iterative nature of explicit and implicit processing is valuable to creativity. The conscious system has a limited capacity and processes things sequentially; the unconscious system has far greater capacity and processes things in parallel (Sawyer 2012, p.98). This allows for broad associations to be made, which leads to novel and useful solutions and ideas (Stanovich 2005).

In the book *'Dance Composition',* Smith Autard (2000) explains that choreographers constantly move from feeling to knowing, a process which has a strong effect on the composition. For example, perception of form, style, and meaning becomes subconscious through experience, and knowledge of composition may be kept at a voluntary conscious level or at the involuntary sub-conscious level. The latter guides intuition and feelings, intellectual evaluation, and analysis, and ensures that insights are valid. Notably, while many practitioners describe their process or decision making as intuitive, it is important to remember that it is deeply rooted in mechanisms which were internalized over time (Melrose from Butterworth & Wildschut 2017). Still, the implicit nature of creativity poses a challenge to those who aspire to explore CPS, especially when it comes to choreography, a non-verbal and partly intuitive practice. This challenge requires a creative solution so that implicit processes can become explicit, ensuring that CPS can be explored. Guiding attention towards focusing more clearly on cognitive activity or intuitive decisions just below the threshold of awareness is described by Heidegger as taking something that is ready-to-hand (functioning with or without the need of conscious attention), and breaking this tacit and unconscious relationship to make it present-at-hand (Heidegger from Carlson 2011, p.89). This method has been proven to work in Carlson's research on choreographers' decision-making, and hence has been adopted and built upon here to suit the study's objectives. In order to extract

information about the techniques choreographers use for structuring and varying their dance compositions, two methods were utilized. First, the task and the constraints the choreographers were presented with encouraged them to think consciously about their choreographic decisions, as they had to avoid what they had already done to be able to create new pieces out of the same pool of movement materials. Considering their past decisions and choreographic options made them become aware of their own artistic choices, enabling them to articulate their process with more clarity during interviews. The second tactic involved observations. By tracking and analyzing the choreographers' actions, I could make sense of their structuring tendencies without the need to rely on the participants' reports or process recollection. Observations allowed for capturing incidents, choices, and patterns the choreographers may not have been aware of themselves, being so immersed with their creation process. All in all, using experimental methods has enabled me to gain insight into the structuring phenomena while exposing some of the motives that drive choreographic decision making.

Chapter 3: Expertise and Problem Solving

Sawyer (2012) claims that creative processes are highly dependent on mastery, experience, and expertise. In line with this statement, this section provides the reasons for studying structuring from the expert's point of view, arguing that experts are better at what they do due to their vast knowledge and experience. Hence, the following paragraphs describe the unique abilities experts possess which make them exceptional problem solvers, focusing particularly on their use of strategies. Furthermore, the factors contributing to decision making in choreography (kinaesthetic and conceptual knowledge, situated awareness, and distributed creativity) will be explained, demonstrating how expert choreographers exploit these to their advantage.

3.1 Expertise and Problem Solving

Experts are people who have dedicated time to learn a field and have applied that learning in their long-term practice. They have become recognized as being extremely knowledgeable or skilled, and therefore experts tend to be better than non-experts at solving problems that relate to their field (Goldstein 2011). Experts have a much better sense of judging, not because they are more reasonable than others but because they direct their thoughts differently. As Decarts (1985) notes "It is not enough to have a good mind; the main thing is to apply it well" (from Cvejic 2017, p.34).

In cognitive science, expertise is defined as the skilled execution of highly practiced sequences of procedures (Anderson 1982; Ericsson et al. 2006). Several decades of research have shown that experts have acquired a variety of cognitive structures that contribute to their performance (Ericsson 1996; Sternberg and Grigorenko 2003). These structures provide many advantages to experts when solving problems, as they allow for easier access to previous solutions (Logan 1988) and learned procedures. Experts have more developed representations that capture the more important features of the domain (Chi et al. 1981). They are able to quickly recognize complex patterns (Gobet & Simon 1996), and they mainly focus on the deep structure (underlying principles) of the problem. Metacognitive skills enable experts to strategically encode the nature of a problem by forming better mental representations, which

can be employed more automatically (Sweller 1988), selecting appropriate plans for solving the problem, as well as identifying and overcoming obstacles to the process (Davidson & Sternberg 1998).

Research has shown that experts spend more time analyzing problems instead of solving them instantly because they try to understand them first. This method is slow at the start, but it eventually produces better results (Colley et al. 1992). Experts are good problem solvers because they seem to gain evaluation procedures that ensure effective utilization of knowledge (Jeffries et al. 1981). They recognize different problem situations that invoke certain solutions (Sweller 1988), and often have a better idea of how a given solution may or may not work (Bauer et al. 2010). Novices, who do not possess well-developed problem schemas, are not able to recognize problem types, so they must rely on general problem solving strategies such as information-processing approaches, which provide weak strategies for problem solutions (Mayer 1992). Experts, on the other hand, direct their attention to what matters and transform or rearrange it to reach a goal efficiently (Sobel 2001). They perceive more details of situations because the familiar aspects of tasks do not make demands upon their conscious thinking and acting. Hence, high levels of expertise seem to involve a change from a conscious struggle to effortless, even automatic, performance (Lawson & Dorst 2009).

One general finding concerning experts which is of extreme relevance to this research is the use of strategies (Schunn et al. 2005). A strategy[3] is generally defined as a plan to achieve one or more goals under conditions of uncertainty (Freedman 2013). Strategy generally involves setting goals (e.g., solving a choreographic problem), determining actions to achieve goals, and executing actions (Mintzberg et al. 1996). Strategies make creative breakthroughs easier to achieve by making hard problems easier, and once internalized they free the mind all the more (Hajek 2014).

Lemaire and Siegler (1995) have proposed a four-layered account of expertise from a strategic perspective, the Adaptive Strategy Model (ASM). This model is general enough to explain why experts in all walks of life are better problem solvers. According to this model, experts have better strategies (strategy existence), tend to use better strategies more often (strategy base rate), are better able to select

[3] The origin of the word portrays a commander or general, as being "above", watching the battle from a higher position and thus, watching with a "wide vision", observing clearly what his own army is doing as well as what the enemy is doing and ordering his men to act consequently (Garcia 2012).

the circumstances to which a strategy best applies (strategy choice), and are better able to execute a given strategy (strategy execution) (From Yilmaz et al. 2011). The use of strategies by experts has been explored extensively in creative fields such as design (Cross 2003, 2004; Park et al. 2008; Kruger & Cross 2006, Yilmaz 2011) however, to the best of my knowledge, there are no empirical studies that investigate the use of strategies for structuring and varying dance designs. Therefore, the plan was to fill this gap by examining the creative processes of two expert choreographers, extracting and comparing the structuring methods they employ as they construct three dance pieces. This process has eventuated in a taxonomy of strategies that is domain-specific, a model that can be used by novice practitioners for developing their practice and enhancing their creativity.

3.2 Expertise and Problem Solving in Choreography

So far, the unique attributes that allow experts to solve problems more efficiently have been explained. However, in this section, I will focus specifically on choreographers and the factors that influence their decision making, highlighting how expert choreographers use these factors to their advantage. Overall, choreographic cognition is influenced by and distributed between kinaesthetic and conceptual knowledge, situated awareness of the immediate context, and distributed cognition or creativity (Hollan et al. 2000; Kirsh 2010, 2011; Nardi 1995; Risner 2000). These concepts will be further elaborated in the following paragraphs.

3.2.1 Kinaesthetic Knowledge

“My body has determined a lot of our dancing because I sense the body a certain way and it informs me a certain way. So, it is a very personal view of the world, and that is the nature of choreography” (Forsythe 1999 from Cvejic 2017). This statement from choreographer William Forsythe is well supported by scientists who today acknowledge that dance and choreography involve an exceptional multimodal blend of physical and mental processes. Dance practitioners use their body as a tool to think with and their sensory systems as engines to simulate ideas non-propositionally (Kirsh 2011). “Psychologists know that bodies clearly play an important role and that embodiment and multimodal sensations are an integral part of self-meaning. Thus, dance and choreography provide a

unique platform for study, using both quantitative and qualitative methods on how thought and abstract senses of the embodied self work" (deLahunta et al. 2009, p.434). In line with these understandings, it is safe to say that decision making in choreography is highly dependent on the choreographers' kinaesthetic knowledge. Kinaesthetic knowledge refers to what and how the body knows what it does. It is shaped by several elements; a person's bio-mechanical structure, learned ability to function, personality, training, life experiences, movement habits, and self-perception. Choreographers apply this knowledge to solve choreographic problems (e.g., How to move? What does it feel like? What does it look like?) in order to achieve goals and creative outcomes. For example, choreographers often find inventive ways to inhibit immediate and habitual responses in order to stimulate novel solutions by imposing constraints, gathering the right information, developing awareness, considering different alternatives, and creating new patterns (Gelb, 1987).

3.2.2 Conceptual Knowledge

Conceptual knowledge is knowledge about the craft of choreography that can also be considered as explicit knowledge (Bara 1995) and is enacted through the body. This includes the understanding of compositional methods and structures, dance materials, and style. In other words, how choreographers structure and develop compositional material through knowledge gained outside of their subjective physical experience is considered conceptual knowledge (Carlson 2011). Smith-Autard (2000) explains that a successful dance piece is dependent on the choreographer's knowledge of dance materials and styles as well as methods of construction. According to her, a novice choreographer cannot produce the same level of sophistication when creating a dance piece when compared to an expert. Indeed, the solver's level of domain knowledge seems to be a strong predictor of problem-solving skills. This is because well-integrated domain knowledge is important for understanding problems and for generating adequate solutions (Jonassen 2000). In that sense, expertise in choreography could also be reflected in the conduct of the creative process. It informs the way choreographers relate to their dancers, generate movement material, manipulate and edit that material, and orchestrate the variety of choreographic elements within the emerging work (Carr 1999 from Butterworth & Wildschut 2009).

3.2.3 Situated Awareness

Etchells (2009) describes the creative process of American choreographer Meg Stuart as such: “I really start to wonder why she works like this, with so many voices around. But what I’ve learnt is that Meg is only listening sometimes, absorbing boldly at others, and at other times she is processing, deep in the background, riding the waves of what goes in the room. That all this stuff is moving in and out of and around her, waiting for a moment where the need or the intelligence of it coheres and she has something in her sights…..” (from Stuart & Peeters 2014, p.130). This quote highlights two important aspects. One is the affect of the surrounding on the choreographer, and the other is her selective attention to what goes on around her. Out of all the different stimuli that occur simultaneously, she attends to particular ones, and sometimes she is busy with her own thoughts.

From the Situationist’s approach, each problem is tied to a concrete setting and is resolved by reasoning in situation specific ways, making use of the material and the resources locally available. In this sense, problem solving is a form of reasoning that is deeply bound up with the activities and context in which it takes place. Thus, the situational approach highlights how much is embedded in the social, cultural and material aspects of situations (Jonnasen 2000).

Choreographic decisions are highly influenced by choreographers’ awareness of the present moment (Pallant, 2006) and how they process the information they perceive and respond to it. Present components can include the choreographer’s internal state (such as emotions, intentions, curiosities, goals, or sensations) or the external state of the environment (such as affordances of architecture, structure, sound, other people or objects, gravity, or light). Becoming aware or directing attention is either a possibility or a contingency, either something we choose or an event that happens to us (Mullarkey 1996 from Cvejic 2017). In any case, experts are better skilled at focusing on many corresponding elements with the goal of constructing a composition in the present. They have the ability to shift their attention to the most important or dominant element while continuously keeping a subdominant attention on everything else (Schiphorst 2011).

In the present study, observations and interviews exposed what the choreographers paid attention to the most during their creation process. By extracting the changes they applied to a certain composition and calculating their frequency of occurrence, it was possible to determine what sorts of issues they attended to the most. The results were then compared with the statements they provided in their interviews in which they described their creative process, goals, and intentions. Becoming familiarized with the practice of experts may support others in understanding what they should focus on during their own creative processes, especially when under time pressure and when dealing with different constraints.

3.2.4 Distributed Creativity

Until now, the focus has mainly been on the choreographer and their problem solving or decision making processes. However, choreographic discoveries and innovations go beyond the skills and expertise of the choreographer. Creative processes are deeply embedded in cooperation and teamwork and dependent on the distribution of creativity (McKechnie & Stevens 2009). Distributed creativity is the mechanism "by which team members harness resources to interactively invent new concepts and elements, and then structure things into a coherent product" (Kirsh 2011, pg.1). These resources include the choreographers' and dancers' physical abilities and training, their compositional training, their cultural, social and aesthetic influences, their personality, background, and life experiences. This distribution of expertise and ability to make connections between different types of knowledge make up the creative craft (Gabora 2000).

Distribution of knowledge is important to understand as it affects the creative process. Every decision is situated in the context: the experiences of the choreographer and the dancers, the goals of the group, and the choreography (Nardi 1995; Suchman 1987). Nowadays, there are many choreographers (e.g., William Forsythe, Wayne McGregor, and Xavier le Roy) who deliberately search for ways to maximize creative input during their creative process by utilizing the groups' different perspectives and skills (Albrecht 2013; Butterworth 2009; Forsythe & Noë 2009; Vass- Rhee 2011). Such choreographers invent new practices and look for ways to mobilize others and create a real cooperative environment (Becker 1982, p. 308; Cattani & Ferriani 2008; Zehnder 2016). Still, literature in dance and documentation of creative processes portray a wide range of collaboration types. One model that

attempts to capture the different modes of dance-making is the didactic-democratic framework by Butterworth (2009). Through a continuum of five distinct approaches, the model puts forward a series of roles for the choreographer in relation to the dancers and identifies shifts in skills, methods, and interaction. On one end of the scale, choreography is approached from a directed 'teaching by showing' methodology, termed 'didactic', and on the other end of the scale, a dialogical 'democratic' approach, wherein the participants learn to work in a shared, cooperative, and collaborative manner. Notably, while in theory there is a clear distinction between these forms of practices, in reality there is a 'slippage' between these frameworks, meaning that several of these processes may be utilized in one project. Often the choreographer will decide what will be the right approach depending on the context, the participants' needs, and the intended outcome (Butterworth from Butterworth & Wildschut, 2009, P.177)

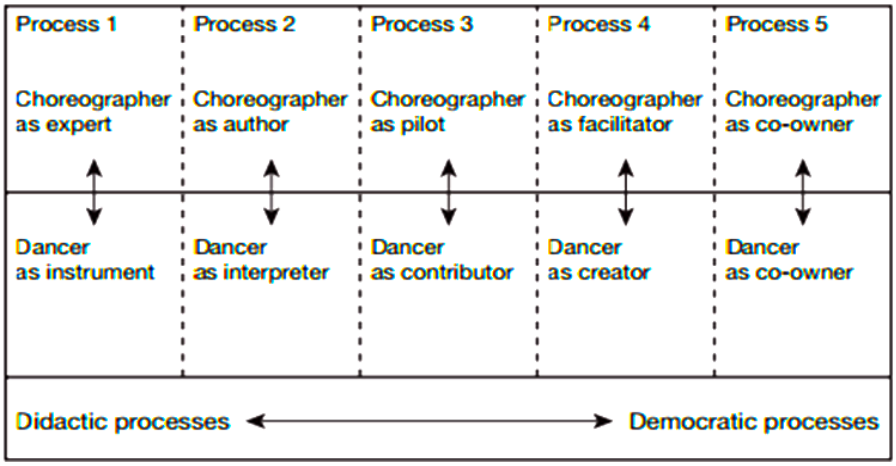


Table 3.2.4

Butterworth's model of democratic-didactic approach to dance-making

(Butterworth & Wildschut, 2009, P.177)

Throughout their work, choreographers depend on the dancers for material and interpretations. Dancers create movements. They give feedback to each other, devise strategies for work, and participate in an exchange of ideas. Yet, it is still generally accepted that choreographers have a different view of the piece than the dancers, since they act as an external eye, making decisions about both seemingly small things, and also bigger issues than just the movement. Choreographers often see the all-embracing concepts behind a dance and set the tasks to engage the dancers' responses (Farrer 2013). In the light of this information, the fact that structuring requires a broad viewpoint and a thorough understanding of the concept, the choreographer's structuring decisions will be the main focal point of the present study. Still, any explicit contribution the dancers make towards the construction of the piece will be noted and

analyzed. The dancers will also be given questionnaires in which they can articulate their contribution to the structuring process and explain when and why it was required.

The value of collaboration was questioned in the past. Some theorists acknowledged its benefits and others dismissed it altogether. While one group believes that collaboration enhances engagement, allows for a shared vision, sharpens problem solving skills, and accompanies discoveries that otherwise would not be achieved, the other group believes it can eradicate individuality or artistic genius and vision because it is based on compromise:

“All the friction of two very different creative minds sparking together is dulled into bland, obscure banality by too much cooperation” (Heaton 1995 from Butterworth 2017, p.199).

By analyzing the interviews with the choreographers and dancers participating in the present study, it will be possible to discern whether the contributions of the dancers supported problem solving and the structuring process in a positive or negative way.

3.3 Conclusion

In this chapter, the factors that affect choreographic cognition were discussed. Conceptual and kinaesthetic knowledge, situated awareness, and the manner in which creativity is distributed all influence the choreographer’s construction and organization of information towards movement craft (Barnard & deLahunta 2017). While conceptual knowledge drives the mind to imagine the impossible, our kinaesthetic knowledge grounds us in the possible. Hence, choreographers explore the interplay between the imagined potential, constrained by physical ability and the variables and affordances of the context (Carlson 2011). As the main focus of this study was the structuring process, observations and interviews were used as means for exposing the aspects that affected the choreographers’ decision making in this particular stage. Therefore, the participants were asked about their motivations and plans, their experience of the situation and the factors that played a part in their decision making. At the same time, their actions were noted, exposing how they used their knowledge and experience for structuring their dance pieces.

Notably, after reviewing cognitive accounts on expertise, I better understand the value of learning about the craft of choreography from experts. While inexperienced choreographers may also be able to create successful dance works, they do not necessarily know how to do so in the same manner that highly-experienced choreographers do (Pakes from Butterworth and Wildschut, 2009). Therefore, it is experts' systematic, consistent, and well-informed problem solving capabilities that this research aimed to uncover. Still, I deliberately chose two choreographers who have different backgrounds, artistic styles, and practices to participate in the present study. This is because I was highly interested in finding out what is it that they do similarly and differently when it comes to structuring and varying their dance compositions.

Chapter 4: Design Strategies

In the previous sections of the literature review, structuring and the challenges it involves were discussed. The structuring process was associated with complex and ill-defined problems, suggesting that these kinds of problems are often resolved through applying domain-specific strategies. Moreover, the important role creativity plays in the choreographic process was explained, whilst highlighting several elements (e.g., time, quantity of ideas, and conscious and subconscious processes) that have an impact on decision making and outcomes. Other factors known to specifically affect choreographers' decision making were elaborated, including: conceptual and kinaesthetic knowledge, situated awareness, and the distribution of creativity.

In every part, it was demonstrated how theories influenced the study design, while emphasizing the lack of information when it comes to structuring stage. Dance literature provides general choreographic strategies for practicing choreography (finding stimuli, using abstraction, practicing improvisation, manipulating movement motives, selecting amongst different types of forms, evaluating the work, etc.). However, little is known about the more specific methods expert choreographers employ for structuring and varying their dance compositions. The use of strategies by experts was studied in other creative fields such as design. Design and choreography have much in common. In both fields, concepts or ideas are realized into a configuration, model, pattern, plan, or specification that helps achieve a designated objective[4]. It is also very common for design and dance practitioners to consider the aesthetic, functional, economic, and socio-political dimensions of the design object and design process, as well as to use considerable research, thought, modelling, interactive adjustment, and re-design (Designing according to Brinkkemper 1996). In both areas, practitioners must take into consideration the point of view of the user or audience, and ensure the outcome is original or that it at least adds value to existing works (Designing according to Yilmaz 2011, p.388).

Even though there are some differences between the two fields (e.g., designers design objects that have functional uses and choreographers do not; designers have a better idea what the outcome should be and

[4] Definition of design according to Cross 2006; Heskett 2002; Merriam Webster 2018; Koskinen et al. 2011

choreographers do not; choreographers work with the dimension of time and designers often do not), when it comes to structuring, it could be argued that both professionals must ensure all the parts of their project come together to create a coherent whole. Designers and choreographers alike are constantly engaged in an ongoing problem solving process, modifying and reshaping their ideas and the object they are working on. They may change the overall form, solve functional problems, add features, improve efficiency of parts, and/or test ways to engage the audience/user. Due to the obvious similarities between choreography and design, theories and models of design strategies were found useful in providing an ideological foundation for the purposes of this study. It was particularly through the study of Yilmaz et al. (2011) that it was possible to establish a research framework suitable for exploring structuring strategies. The Yilmaz et al. study has shown that the work of experts reflects the systematic use of strategies. Their findings suggest that variations in design appear to be well captured through the use of strategies. Design strategies assist designers in exploring and identifying new and unexpected variables and contexts that could alter the design criteria and the solutions in different ways, resulting in the invention of diverse concepts. Yilmaz et al. argue that by applying these strategies it is possible to explore new problem-solution spaces, extend creative thinking, and generate innovative designs. In the following section, the types of strategies designers and choreographers use for refining and varying their designs will be outlined.

4.1 Expertise in Design

Researchers who have studied design processes have identified the typical methods experts employ for solving design problems. Generally, expert designers formulate a broad view of the problem, as opposed to merely accepting narrow problem criteria. They frame the problem in a distinctive and personal manner and use ‘first principles’ or design methods to embody the concept (Cross 2003). Expert designers use adequate ‘problem scoping’ and focus on gathering problem information and prioritizing criteria (Cross 2004). They evaluate multiple solutions (solution-focused) before implementing them, as opposed to focusing on the problem itself (Kruger & Cross 2006). Expert designers use general discipline knowledge, rather than problem analysis, which means their expertise is reflected through their ability to alternate between different types of practice (Yilmaz et al. 2011). Expert designers shift

attention between different aspects of their task and between different modes of cognitive activity with the purpose of uncovering a wider variety of solutions (Park et al. 2008). They also tend to stay with early solution concepts, developing these concepts further as opposed to finding completely new designs (Cross 2004).

In line with these findings, this present study aimed to form a theory that could explain how expert choreographers solve problems. Therefore, the strategies two expert choreographers used during the creation of three dance pieces were extracted and analysed. Any commonalities between the two participants were noted, and compared with what is known so far about experts in other fields. The intention was to draw connections between choreographers and other practitioners, uncovering similarities in their problem solving approach.

4.2 Yilmaz et al. Model of Design Strategies

In the article '*Creativity through Design Heuristics*', Yilmaz et al. (2011) discuss three types of strategies employed by industrial designers. They claim that these strategies support the creation of novel design concepts by guiding designers' exploration of possible solutions through varying product characteristics. At times, the strategies used were founded on the recollection of previous solutions, but mostly on the active construction of new ones.

Yilmaz et al. claim that design strategies assist designers in exploring and identifying new and unexpected variables and contexts that could alter the design criteria and the solutions in different ways, thus resulting in the invention of diverse concepts. They argue that by applying these strategies it is possible to explore new problem-solution spaces, extend creative thinking, and generate innovative designs. The changes in design could then be identified in relation to different aspects. Sometimes, the changes relate to form, and sometimes to function. Others addressed ways to add features, increase efficiency of organization, or engage the user. Notably, these are all elements choreographers consider and modify in their own processes. Choreographers may merge sections (form), change a section's speed (function), add more dancers to a particular part (adding features), clarify transitions between sections (efficiency), and/or refine the performance quality of the dancers (engage audience).

4.2.1 Local and Transitional Strategies

In their article, Yilmaz et al. define two types of strategies (heuristics) for varying designs (see Appendix 1 for a list of design heuristics). One is, 'transitional', focusing on the transitions through designs (e.g., reversing components, attaching/detaching components, or extending certain elements), and the second type is 'local', characterized by its application to generate details observed within a single identified concept (e.g., use of a common base for different components, apply an existing mechanism in a new way).

Incidents of local and transitional use of strategies can also be found in choreography. Choreographers are responsible for refining their dance piece, making minor changes and improvements without altering the general choreographic structure (local strategy). They may perform different manipulations of aspects relating to time (e.g., performing sections faster/slower), space (e.g., change a movement phrase to face the back/front), or energy (e.g., performing a movement phrase sharper/softer), and could decide to add or remove features or dancers from sections.

On other occasions, choreographers may choose to make more radical changes (add, remove, merge, repeat, shorten, alternate, or extend sections) to the piece's overall structure by applying transitional strategies. For instance, choreographers may completely remove a section if they find the piece to be too long or if it does not integrate well with other sections. Here is how choreographer Elizabeth Streb describes her creation process working on a performance titled 'Bounce':

"I have not changed Bounce (a section within the work) cause I think it's still good enough to be in the show. But everything else I've changed. I get bored, and I cut sections out, or I make them shorter. I question why we are still doing this, or that. Right now there are about twenty moments in the show. Everything is getting shorter" (Morgenroth 2004).

The last example alongside the other examples I mentioned before demonstrate how designers' and choreographers' practices relate. In both fields, practitioners rely on similar strategies (e.g., local and transitional) for developing and refining their work. And so, due to the commonalities between the two fields, I decided to use a classification system from the field of design for investigating the application of

strategies by choreographers during the structuring stage. The aim was to reveal what type of strategies choreographers utilize more often and why. And so, by analysing data collected from interviews, observations and questionnaires, I was able to form a theory that explains more broadly the involvement of strategic thinking in the choreographic process.

4.2.2 Multiple Strategy Use

Yilmaz et al. point out that working on the same project, expert designers come up with alternative designs. They explain that varying designs is made possible due to the application of numerous strategies in an integrated fashion. They named this phenomenon 'multiple heuristic (strategy) use'. An interesting observation they make is that carrying out the same strategy does not allow for exploring the problem space thoroughly, and that it is only when many more strategies and changes are applied that a novel design is generated. A design alteration may therefore include the following strategies: changing the configuration by using the same design elements, merging a variety of components, and repeating the design elements.

Yilmaz et al. provide two explanations regarding the use of multiple strategies. The first relates to the strategies' relationships and dependencies, meaning that a number of strategies must be applied together in order to enable a certain change. However, they also suggest that expertise may involve repeated experience with the simultaneous application of related strategies, and that the patterns of strategy usage may reflect the designer's unique style or learned behaviour. Yilmaz et al. propose that design expertise may follow a developmental sequence, from learning individual strategies and becoming skilled in their application, to eventually developing patterns of multiple strategy applications.

Based on this information and the complexity involved in choreography, it was predicted that choreographers most probably use multiple strategies during their creative process just like designers. Therefore, the aim of this study was to find out what sort of combinations they use and for what reason. Observations were utilized as a tool for tracking the structuring strategies the choreographers applied during a single process, and interviews aided in exposing the rationale behind applying them. Together it was possible to see what drives the choreographers' decisions during the structuring stage.

4.2.3 Process Strategies

During their study, Yilmaz et al. observed that some design changes appear to be a strategic choice to force changes in a certain direction (e.g assigning a particular context or changing it). They identified this type of design strategy as 'process heuristic (strategy)', a tool for developing different approaches to the design problem. Process strategies were found to guide the designer's approach through the solution space, particularly in situations when there is a conscious fixation on a certain aspect of the problem. The nine process strategies Yilmaz et al. describe in their study are defined in the table below and are complemented with examples from the field of dance. Noticeably, some of these categories overlap.

1	**Assign form to each function**	Giving form to each function separately, and creating a relationship between these forms (separate, attached, or merged pieces)
2	**Brain-write**	Using brainstorming sessions and generating words describing the constraints and variables to suggest new concepts
3	**Contextualize**	Assigning a context or changing it if it exists
4	**Evaluate**	Giving value to the idea and then staying with or leaving it
5	**Synthesize**	Merging different concepts into one
6	**Switch level of focus**	Changing from a general system-level design focus, to one of a specific concept element, and back
7	**Propagate**	Once a new concept element is identified, trying to apply it to other existing concepts
8	**Analyze morphology**	Identifying different ways of achieving the same function and combining and substituting each way to generate a new concept
9	**Prioritize certain constraints**	Selecting and prioritizing certain constraints and developing concepts satisfying those

Strategy 1: Assign Form to Each Function

Definition: Giving form to each function separately, and creating relationships between these forms.

Dance-making is not always a linear process. Sometimes, choreographers will develop different ideas separately, leaving gaps in the composition that will need to be filled. Israeli choreographer Nava Frenkel explains her creative process as connecting action units. She begins with generating certain events or images that have their own length, action, and expression, organizing them into a sequence only at the very late stages of the process. This requires the order and connections between the units to be tested, which at times results in adapting the inner structure of each unit. Instead of forming a

narrative, she finds connections between different center points of the 'action' units, creating a distorted chain of action reaction. Frankel argues that placing the units next to one another is a structural tool similar to video editing. It helps to observe and understand the nature of the transitions between units or events, and prompts decisions as to whether the units should be pasted together or over-lapped. Forming the structure of the piece in such a way requires a back-and-forth movement from thinking of the event units to the sequence itself while searching for a strong inner logic. In this case, coherency is not achieved conceptually, but more as a function of accumulated content (Brown 2014).

Strategy 2: Brain-write

Definition: Brainstorming for constraints and variables to suggest new concepts.

'Brain-writing' is a strategy by which an individual lists the potential constraints and the criteria that can direct their thinking, and then selects one or more of them, or combines them, to generate new concepts in a new direction (Yilmaz 2011). Using constraints in the choreographic process is a well-known technique for inhibiting choreographic habits and enhancing creativity (Carlson 2011). The 'Brain-Writing' strategy can be well-identified in the system that choreographer Anna Halprin has created for forming her dance pieces. The process is titled RSVP: an iterative circle of actions that encompasses: (1) finding various sources of inspiration, (2) constructing a score, and (3) observing and evaluating the performance. Notably, the system is not linear. That means that different parts can feed each other in an iterative manner (Brown 2014). And so, it could be that the score or sources of inspirations are adapted a few times, based on the problems the choreographers identified along the creative process.

Strategy 3: Contextualize

Definition: Assigning a context or changing it.

Assigning a particular context can alter the design criteria and the solutions in different ways, resulting in the creation of diverse concepts. This practice could be associated especially with the practice of reworking old works. Many ballets (e.g., *'Giselle', 'Cinderella', 'The Sleeping Beauty',* and *'The Rite of Spring')* were readapted into a new contemporary format by giving the pieces a new context. The ballet *'Swan Lake'* was restaged according to the personal interpretations of artists like Mathew Bourne, Mats

Ek, Garry Stewart, and recently by Alexander Ekman. Still, every artist undertook different liberties in altering the previous design; some presented a close replica of the original production, while others rejected nearly every tangible aspect of the original production, leaving only a trace of it noticeable in a theme, a single movement, or simply the title of the new piece (Bergstrom 2013, p.1). Choreographer Mats Ek, for instance, adhered to some aspects of the original versions (mainly basic storyline and music), however, his version diverged greatly from the 19th-century ancestors with the intention of making these past stories a product of modern times (Bergstrom 2013).

Strategy 4: Evaluate

Definition: Placing value on the idea and then staying with it or leaving it.

By valuing certain ideas more than others, choreographers restrict their design choices and work within a very specific framework and its constraints. For instance, choreographers' predisposition towards minimalism in the past has been influencing the way they construct their dances. Minimalism was highly favoured by many postmodern artists, and it is still highly valued and practiced by a number of contemporary artists. This inclination fostered the use of repetition as well as accumulation and layering. By utilizing these methods, the content was processed in a way that revealed the structure of the piece and its strict formalism (Rutherford-Johnson 2014). For example, in 'Accumulation' (1971) by Trisha Brown, 30 movements are gradually assembled and then detracted. Initially, one simple gesture is presented. It is repeated for a while and then gesture 2 is added. Then the two gestures are repeated until gesture 3 is added and so on.

Anne De Keersmaeker, is another choreographer who is known for her minimalist approach. In her piece Fase (1982;1993), not only does she values minimalism but she also adheres to the principle of gradual phasing. Each part of the piece encompasses repeated movements that transform slowly through tiny variations. Initially, movements are perfectly synchronous however, they gradually start shifting. This type of continuum results in changes in forms and patterns (Rosas 2019).

Strategy 5: Synthesize

Definition: Merging different concepts into one.

The process of synthesizing two concepts (or more) into a new one is very dynamic, as it requires the shift of attention between new and revisited concepts. In her piece *'Line Up'* (1976), Trisha Brown merged different parts of her previous works into new juxtapositions and used the principle of lining up as an organizational rule. Interestingly, these choices eventually led to the integration of two other concepts: order and disorder (Smith-Autard 2000).

Choreographers such as Ohad Naharin and Sidi Libi have also taken advantage of the synthesising method. The pieces *Decadance (2000) and Project 5* (2008) by Naharin involve a combination of excerpts from his previous creations that were reworked and reorganised. In *Decadance* all the sections are part of his previous repertoire while in *Project 5,* he mixes old experts with a completely new section (Bolero). Similarly, in his work, *4D* (2013), Larbi, combines four duets from recent works. "These four duets were revised, nurtured to realize their potential as freestanding works and brought together to form a full-fledged program" (Eastman 2019).

Strategy 6: Shift level of focus

Definition: Switching focus from the general system to specific elements.

Schom and Wiggins (1992) found that designers proceed through cycles of 'seeing-moving-seeing', reinterpreting shapes and relationships, and transforming these reinterpreted shapes. Expert designers alternate quickly between different aspects of the task and between different modes of cognitive activity (Park et al. 2008). They shift from designing the overall system to designing the details of individual components, and back again, thinking about the depth and breadth of concepts. This back and forth movement allows designers to explore new perspectives and solutions, which results in uncovering novel designs and ideas.

Choreographer Meg Stuart (2014) states that she tends to switch between thematic and formal

assessment, looking at the piece once from the outside and once from the inside, shifting from focusing on the small details to viewing the piece as a whole. She reconsiders the structure repeatedly throughout the process, relying on her intuition without losing the ability to take a critical distance from the process and research. Changing her focus between the micro and macro aspects of her work while assessing the situation at hand, eventually leads to shaping and refining the composition.

Strategy 7: Propagate

Definition: Applying a new concept to other existing concepts.

According to Yilmaz et al. propagating a new concept element to other objects in different concepts increases the generation of novel ideas by going back and forth between major design concepts, rather than settling on just one. This switch can occur for the whole structure or for individual components, and was found beneficial for overcoming fixation and for increasing further details within the initial concepts. In Itamar Serussi's piece 'Phenomena' (2009), a solo work was adopted into a new piece that holds almost no traces of the original solo. This is because he introduced a new concept element, using a group of dancers, which changed the initial design completely.

Strategy 8: Analyze Morphology

Definition: Identifying different ways of achieving the same function, and combining and substituting each way to generate new concepts.

Contemporary choreographers often challenge conventions by finding different ways in which a certain function can be achieved. One of them is the use of music in a production. For a long time it was believed that dance should sync with music. However, in the last few decades choreographers have continuously experimented with how these two art forms co-exist. The following example demonstrates how the function of coinciding with the music is interpreted in a new way and thus leads to a novel dance form. Trisha Brown formed the piece '*Twelve Ton Rose'* in 1996. The musical structure provided her with a simple ABA framework (whereby the middle section is followed by the same/similar section that precedes). However, the choreography did not respond to the music in a conventional way. Instead of moving to the music, the dancers were keyed to a different instrument, but only moved when their

instrument fell silent, therefore counterpointing the music and moving when it is least expected (Fogelsanger 2000). In this case then, the dancers take their cues from the music and they also contrast it, combining two ways to achieve the same function (dancing to the music).

Another example wherein the strategy Analyse Morphology was applied was during the creation of the piece It's In The Air (2007) by Mette Ingvartsen and Jefta van Dinther. During the four parts of the piece the concept of human machine interaction is tested in different ways. Two performers come in contact with two trampolines through different body parts, at times they move in sync and at other times the two develop rhythms of syncopation, convergence, and divergence. In one part they perform on separate trampolines and in others they are placed on the one trampoline or keep moving between them ("squaredance"). All in all, "the choreographic composition of IITA amounts to a construction of constraints in which movement and the body, as well as their relation, constantly change.… The trampoline becomes the choice of severe limitation, a radical physical constraint on movement production, as it substitutes a resistant surface for the stable ground of the dance floor" (Cvejic 2017, p. 85).

Strategy 9: Prioritizing Certain Constraints

Definition: Selecting and prioritizing certain constraints and developing concepts satisfying those.

Selecting certain constraints and prioritizing them over others has a strong influence on the development of the piece's structure. The concept of using consciously imposed constraints to provoke situated and creative possibilities is not only utilized by choreographers and designers, but also "by artists throughout history. Creative catalysts are often used to explore ideas in new ways and to push the artist's choices and actions beyond known answers. Artists often create their own constraints to explore new possibilities for change" (Carlson 2011, p.29).

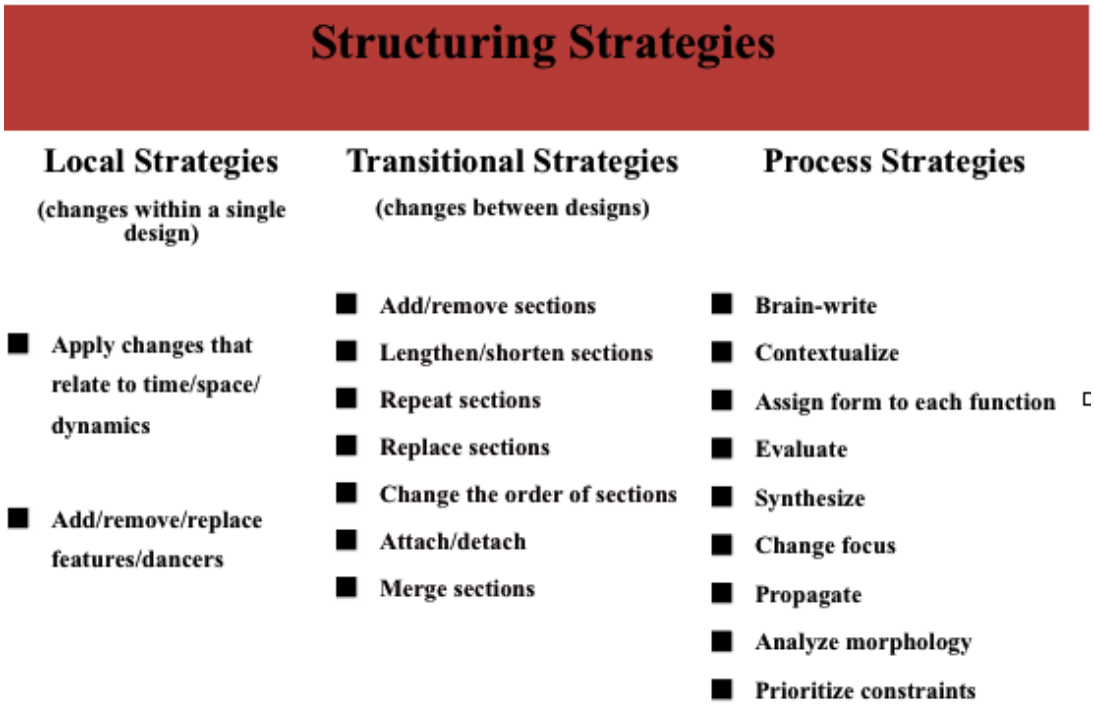
For instance, prioritizing stillness or slowness led Eszter Salomon to create Nvsbl (2006), where continuity is achieved by installing a radically slow pace. Salomon set up a macro structure where four dancers progressively move towards each other as their movements gradually become smaller. The movement is so slow that it is only when you disconnect from the performance for a while and reconnect

to it later that you can notice any change (Cvejic 2017). In this case, committing to the one constraint throughout the piece not only gives it a strong coherency, but it also stretches the boundaries of what is expected of contemporary dance. This is because the choreographer explores only one type of movement quality as opposed to many.

To conclude, the examples provided in this section have clearly shown that process strategies are practiced both by designers and choreographers. In this current study, interviews and observations aided in identifying which process strategies were applied by the choreographers during their creative process and for what reasons. These methods also aided in pinning down other process strategies that were not mentioned in Yilmaz et al. list.

4.3 From Design Heuristics to Structuring Strategies

So far it has been demonstrated that choreographers and designers operate in a similar fashion. Both apply multiple strategies for refining and diversifying their designs, and both rely on process strategies for extending their creativity. Strategies are used as means for resolving a variety of problems. By applying them, practitioners transform the design both on the micro and macro levels. Still, as argued previously, choreographers employ strategies that are domain-specific. Therefore, based on what is known so far about choreographic devices and what is known about design strategies, I formed a new model for categorizing structuring strategies (see table 4.3). This model enabled the systematic coding and sorting of information that was extracted from interviews and observations. Consequently, it was possible to identify the structuring tendencies of the choreographers and to compare between them. Overall, changes in the detail level (i.e local strategies) were broken down into several categories, involving adding, replacing, or removing features as well as modifying temporal, spatial, and dynamical aspects. On the other hand, changes that affected the overall structure (i.e. transitional strategies) were divided into seven groups, encompassing add/remove sections, lengthen/shorten sections, repeat sections, replace sections, change the order of sections, attach/detach sections, and merge sections.



Tabel 4.3 Possible strategies for varying dance compositions

4.4 Summary

Reviewing literature in the last four chapters has shed light on the world of choreography, problem solving, and creativity. The idea that contemporary choreography is a challenging practice has been established, associating this process with problems that are complex and ill-defined. Faced with unpredictable and uncertain situations, it was argued that contemporary choreographers achieve their goals by relying on domain-specific strategies. Still, not much is known about choreographers' use of strategies, especially when it comes to the structuring stage. This is the main focus of this particular study.

Notably, choreographers not only think strategically, but they also think creatively, and there are various aspects that influence their decision making. Choreographic decision-making is associated with cognitive, physical, and social processes. Yet, one's level of expertise and the context in which they operate seem to have a strong effect on the choreographic process and outcomes. Therefore, making sense of the structuring stage and the factors that influence it required the planning of a particular study. It was decided that the choreographic process of two expert choreographers would be examined in an experimental setting, controlling several variables that could potentially interfere with the choreographers' decision making (e.g., music, theme, piece length, rehearsal time). This choice not only

ensured the reliability of our findings as the plan was to compare the creative processes of the participants, but it also allowed for isolating the structuring stage from other stages, studying it multiple times in greater depth. Generally, the idea was to use observations and interviews as means for capturing the thoughts and actions of the participants as they construct three dance pieces, extracting the strategies they employ for structuring and varying their dance composition. Data was classified under a model that was adapted from the field of design which enabled to identify different patterns of strategy use.

Studying choreographers' application of strategies can facilitate the development of expertise by providing explicit instructions for structuring at the early stages of training, leading to choreographers gaining quicker practical skills for maximizing the variety and novelty of their designs, while providing them with the tools for solving problems more efficiently. This information can also benefit expert choreographers as by becoming aware of their own structuring tendencies, they can rethink what serves them the most.

4.5 Research Questions

Based on the literature reviewed in the last four sections, I have formulated the following questions. These questions had a major influence on the research method which is described in the following chapters.

Q1: How do expert choreographers structure their dance compositions?

Q2: What sort of strategies do expert choreographers utilise for structuring and varying their dance compositions, and what is their frequency of usage?

Q3: Is there any relation between the quantity of strategies applied during the structuring process and the quality of the final outcome?

Q4: What is the effect of rehearsing time on the structuring process?

Q5: Can the use of explicit strategies support the structuring process of expert choreographers

Q6: How do expert choreographers differ in their approach to structuring?

5. Research Method

5.1 Introduction

Experimental methods were used in this study in order to make choreographic cognition explicit particularly during the structuring stage.

Throughout this chapter, it will be demonstrated how the research method aided in achieving the research objectives and in exploring the six research questions. Previous studies have shown that analyzing creative processes in laboratory conditions can provide fresh insight into creative practices (Brüggemann & Bizer 2016). Therefore, the plan was to examine the choreographic processes of two expert choreographers in a controlled environment wherein several conditions enabled to isolate and repeat the structuring process several times. Keeping the choreographic process authentic was a priority. Therefore, it was important to emulate a real-life scenario as much as possible, ensuring that artistic freedom was not compromised. Consequently, the participants rehearsed their work in their natural environment (dance studio), and they showcased the outcomes in front of an audience. Thus, their artistic choices were only partially constrained.

The following sections will explain in more detail the main elements and procedures that were involved in the study. The given task will be elaborated, followed by a description of the participants, controlled conditions, study phases, and data collection methods.

5.2 The Task

This study involved two expert choreographers who worked with a group of five dancers over the course of five days on a structuring task. The task incorporated two parts: one, solving a structuring problem, and two, integrating a design strategy into their process. These two parts will be described in more detail over the next two sections.

5.2.1 Part 1: Solving a Structuring Problem

Yilmaz et al.'s (2011) study on design heuristics (strategies) examined the design process of an expert industrial designer as he was working on a real-world project over the course of two years. The

researchers analyzed his sequence of sketches, looking for evidence of heuristics use. They found that designers apply particular heuristics that allow them to vary their design concepts and alter existing solutions. Therefore, they concluded that design heuristics maximize creativity and diversity in designs.

Having similar objectives, Yilmaz et al.'s study design was adopted and built upon here to suit the particularities of this study. On the first day of the 'chore-lab', the choreographers were instructed to generate movement material based on the theme 'polarities'. However, during days 2-5 they were required to use this material to create three different dance pieces, each ten minutes in length.

The aim was to condense three creative processes into a single working week while isolating and focusing particularly on the structuring stage. The choreographers were encouraged to think creatively, as they had to continuously consider new ways of varying their dance compositions. The plan was to bring their structuring decisions to the forefront of their attention, making these decisions more transparent and easier to articulate. Inhibiting choices through the use of constraints seemed to improve choreographers' articulation of their own decision making in Carlson's study (2011), thus the same concept was used here.

5.2.2 Part 2: Integrating a Design Strategy

Another study by Yilmaz et al. (2010c) investigated the performance of novice designers after being introduced to design heuristics. Undergraduate students were asked to redesign salt and pepper shakers. However, some participants were instructed in six different design heuristics (e.g. change the scale of elements, change the geometrical form, and nest elements within each other). The findings showed that the experimental group produced designs that were rated as significantly more creative than those of the control subjects, suggesting that using design heuristics can lead to outcomes that are more creative.

Building on Yilmaz et al. study, my intention was to find out whether the utilization of explicit strategies (as opposed to not using explicit strategies: independent variable level 1) can support choreographers in finding new forms and ideas when structuring their pieces. Another goal was to verify whether dance practices can benefit from integrating strategies used by practitioners from similar fields like design.

Therefore, before they began working on their second piece, the choreographers were given a design strategy (independent variable level 2). The strategy, 'nesting', was taken out of Yilmaz's study (2011), where it is defined as making elements collapse, flatten, and fold within themselves. Upon completion of the second piece, the choreographers were asked to describe their experience with the 'nesting' strategy, and on the very last day they were encouraged to explain whether it generated a more creative design (when compared to the other two works where no explicit strategies were used). Based on their professional judgement, it was possible to assess the effect this strategy had on the structuring process.

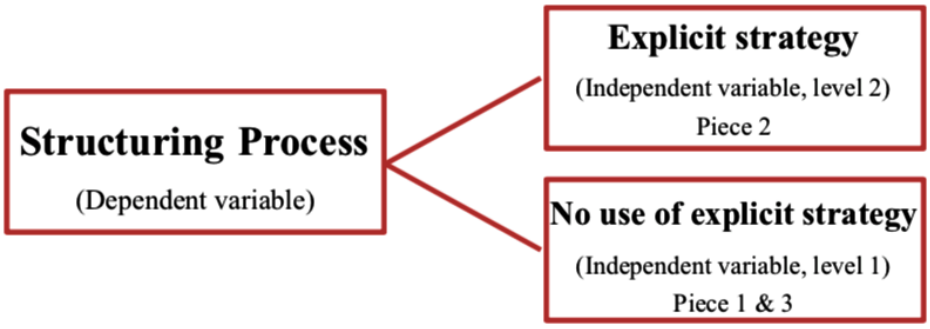


Figure 5.2.2 The effect of independent variables on the structuring process

5.3 Controlled Variables

In experimental designs, any factor which could potentially influence the results must be correctly controlled. "Its effect upon the results must be standardized, or eliminated, exerting the same influence upon the different sample groups" (Shuttleworth 2008). In this present study, several conditions were regulated as the purpose was to reduce external influences on the participant's decision-making. This way I could compare the structuring approach of the two choreographers with minimal biases.

To begin with, the participants were given the same instructions and had the same time frame to complete their task (5 days, 40 hours in total). They worked in the same space (studio 3, SDC, Walsh Bay, Sydney) and with the same number of dancers (5 each). They were provided with an atmospheric soundtrack that had no clear structure, minimizing possible musical influences on their structuring process. At the end of each day, the choreographers were interviewed, and the dancers were handed out questionnaires. While the dancers answered the same fixed questions, the semi-structured interviews were more flexible, involving both pre-planned questions and a more spontaneous dialogue. Overall, the study was set up in a way that stimulated the choreographers to think creatively about their structuring choices. "Within artistic creative decision-making, the addition of constraints requires the artist to work

around, through, and outside of the imposed parameters to adjust their local ideas" (Yokochi & Okada 2004). The concept of using consciously-imposed constraints to provoke situated and creative possibilities has been used extensively by artists throughout history. Creative catalysts are often used to explore ideas in new ways and to push the artist's choices and actions beyond known answers (Carlson 2011, p.29). And so, by limiting the choreographers' creative options, it was possible to examine the strategies they use for varying their dance designs, exposing the methods that support innovation.

5.4 The Participants

The formal study involved two expert contemporary choreographers, ten dancers, and one researcher. All the participants were paid for their participation.

The two choreographers were recruited by the researcher and were selected based on their involvement with contemporary dance, as well as their extensive experience and high level of expertise (both have over 30 years of experience in making dance works). Further, it was important for this research to engage choreographers with different dance lineages and with different approaches to dance-making to ensure that structuring could be examined through diverse practices. The two choreographers were emailed with an information sheet and a consent form, and their choreographic session was scheduled based on their availability.

Sue Healey (age 56) is a Sydney-based choreographer, educator, filmmaker, installation artist, and one of Australia's foremost independent dance-makers. Sue has been creating dance works for both screen and stage and has previously won many awards for her work (Healey 2015).

Gideon Obarzanek (age 51) is a Melbourne-based director and performing arts curator who has extensive experience in making dance-works. In his early career he worked with The Australian Ballet, Sydney Dance Company, Opera Australia, and the Netherlands Dance Theatre. In 1995 he founded the dance company Chunky Move and was its Artistic Director until 2012. His works for Chunky Move included stage productions, installations, site-specific works, participatory events, and film (Chunky Move).

Table 5.4 Participants' age, gender, and years of dance experience

	Age/ Deviation from average	**Years of dance experience/ Deviation from average**	**Gender**
1	31 (+9.7)	28 (+13.7)	F
2	20 (-1.3)	13 (+1.3)	M
3	20 (-1.3)	15 (+0.7)	F
4	21 (-0.3)	10 (+4.3)	F
5	19 (-2.3)	14 (-0.3)	F
6	22 (+0.7)	13 (-1.3)	F
7	18 (-3.3)	11 (-3.3)	M
8	24 (+2.7)	14 (-0.3)	F
9	20 (-1.3)	15 (+0.7)	F
10	18 (-3.3)	10 (-4.3)	M
Average	21.3	14.3	3M ; 7F

The ten dancers involved three males and seven females with ages ranging from 18 to 31 years (see table 5.4). All dancers had been training in ballet and contemporary dance for over ten years and had previously worked with a variety of choreographers. Eight dancers were either part of or graduates of the SDC PPY program. One was a graduate of the UNSW Bachelor of Dance program, and one was a former member of SDC. The dancers were selected based on their availability and experience, and nine of them were recommended by the coordinator of the SDC PPY program. It was particularly important for this project to include dancers who were able to learn and perform choreography quickly, as well as contribute to the creative process by improvising, responding to tasks creatively, and sharing ideas.

The researcher who was instructing the participants and observing the process is also a dance practitioner. She has extensive experience in dance performance, choreography, and education. Her knowledge and background allowed her to be well-attuned to the variety of nuances involved in dance-making and to identify which information should be extracted and further verified during interviews.

5.5 The Study's Phases

Before commencing any official procedures, the study 'The Pragmatic Nature of Creativity' was sent for approval to the Human Research Ethics Committee, Western Sydney University. The study was approved on 13 October 2016 and was given the following ethics approval code: H11809 (see appendix 2).

The study began on the 11 January 2017, and involved two phases that spread over 13 non-consecutive days:

Phase 1 was a three-day pilot study with choreographer Kay Armstrong. It was conducted between the 11 to the 13 of January 2017 (20 hours overall) in the Drill Hall, Rushcutters Bay, Sydney. The aim was to test and improve the study design before conducting the formal study.

Phase 2 involved two formal studies with two different choreographers. The first formal study ran for five days (3, 6-9 March 2017) with choreographer Sue Healey (40 hours overall) and the second (26-30 June 2017) was with choreographer Gideon Obarzanek. Both took place in studio 3, SDC, Walsh Bay, Sydney. The main purpose of these two studies was to explore how expert choreographers structure and vary their dance compositions.

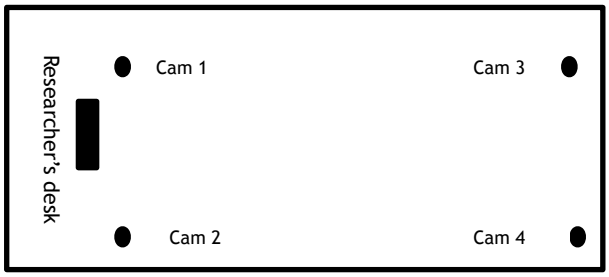
5.5.1 Phase 1: Pilot Study

A pilot study was conducted in order to improve upon the study plan prior to performing a full-scale research project. Therefore, it differed from the intended research by examining the work of only one choreographer, who piloted for three days only (as opposed to five). To ensure biases were prevented, none of its participants were included in the formal study.

In the pilot study the choreographer was given a task to complete. This involved creating multiple dance pieces of 5-10 minutes long out of movement material generated in day one. The choreographer was also provided with a theme ('polarities') and an abstract soundtrack. In the final day of the study (day 3), the choreographer was asked to use a design strategy ('nesting') as a tool for creating another dance piece. The aim was to examine whether these tasks were feasible and whether they supported the investigation

of the study's objectives. Moreover, it was important to find out if the tasks and restrictions aided the choreographer in articulating her creative process and structuring decisions.

The study was recorded with four video cameras and was fully observed by the researcher (see sketch below). The choreographer was interviewed at the beginning of each day and at the completion of each piece while the dancers were filling out their questionnaires. The interviews included pre-planned questions. However, they were also influenced by the researcher's observations and the participants' comments.



A sketch of the pilot study space and equipment

Results from the pilot study influenced the formal study in terms of interview techniques, the study's structure, instructions, time distribution, and other technical procedures. For instance, after the pilot study, the task was reformulated, and instead of giving the choreographer the choice to create multiple dance pieces of 5-10 minutes long, it was decided to stick to a ten minutes timeframe. This decision was based on the choreographer's experiences during the pilot. According to her, a ten minute time-frame was ideal, as it allowed for enough time to develop choreographic ideas meaningfully while still restricting her artistic choices. Since I did not want to compromise the choreographers' artistic integrity, and ten minutes seemed to stimulate critical thinking and problem solving, it was decided to change the task instructions.

Furthermore, after the pilot study, it was decided not to leave the incorporation of the design strategy to the last day. This is because, in the pilot study the choreographer struggled to use this strategy with the little time she had left. Consequently, in the formal study I introduced the design strategy after the choreographers had completed their first process. This way they could experiment with it during the creation of the second piece, before they moved on to work on their third composition.

During a feedback session, the participants emphasized the importance of working towards a goal. They argued that performing their pieces in front of an audience could have changed their mindset from relating to the study as a choreographic exercise to approaching it as a real choreographic endeavour. Based on this advice, and since my intention to begin with was to emulate a real-life scenario, the formal study concluded with performing the three choreographic outcomes in front of an audience.

Another aspect that was altered after the pilot study was reducing the amount of interviews. In the pilot, the choreographer was interviewed at the beginning and end of each day, as well as at the completion of each piece. However, this was very time consuming, and I realized I could collect all the necessary data by interviewing the participants at the end of each day. Lastly, in terms of technical issues, recording the process with three cameras (two in the front corners and one at the back corner) seemed to be enough for capturing the whole space and sounds. Therefore, in the formal study, only three cameras and microphones were used (as opposed to four).

5.5.2 Phase 2: Formal Study

The formal study explored the choreographic process of two expert choreographers who worked with five dancers each, over the course of five days (10 days all together). The researcher observed the choreographers through their studio process and used these observations to inform how the choreographers were interviewed. The process was recorded with three video cameras so that relevant information about structuring could be extracted during the analysis stage. The main goals of the formal study were to explore how expert choreographers structure and vary their dance compositions and to examine the effect of using an explicit strategy on the creative process.

Prior to the commencement of the project, all the participants were emailed with information sheets and consent forms, which they were asked to sign and send back to the researcher (see appendix 3). All sessions consisted of a warm-up (often taking 60-90 minutes), an exploration period (often taking 5 hours), a lunch break (60 minutes), and a 30 minutes interview (see table 5.5.2).

Day one involved a formal introduction, a warm up, and generation of movement material.

First, the participants introduced themselves to each other; the researcher announced the purpose of the study (investigating problem solving in the choreographic process) and shared the overall plan for the week (0.5 hours). Afterwards, the task for the first day was given. The participants warmed up (1-1.5 hours) and then focused on generating movement material based on the theme 'polarities' (about 5 hours). At the end of each day about half an hour was dedicated to interviewing the choreographer, and the dancers were given questionnaires to fill out (see appendix 4&5).

Days 2-5 were dedicated to forming three different dance pieces, and the choreographers were given the freedom to manage their time as they pleased. Often that involved 1-1.5 hours of warm up, a 1 hour lunch break, a 0.5 hour interview session, and the rest of the time (about 5 hours) was dedicated to structuring. After completing their first piece, they were introduced to the design strategy 'nesting' and were asked to incorporate it in their following process while working on their second piece. Once the second piece was completed, all participants reported on their experience with the 'nesting' strategy and evaluated its contribution to the structuring process.

On day 5, at the end of the working process, the three works were presented in front of an audience, and afterwards the choreographers disclosed to the researcher which version they were most satisfied with.

<table>
<tr><th>Day 1</th><th>Day 2-4</th><th>Day 5</th></tr>
<tr><td>Introduction</td><td colspan="2"></td></tr>
<tr><td colspan="3">Warm up session (60-90 minutes)</td></tr>
<tr><td colspan="3">1 hour lunch break</td></tr>
<tr><td>Generate movement material based on the theme 'polarities' (about 4.5 hours)</td><td colspan="2">Work on structuring three different pieces based on material generated in day 1 (about 5 hours daily).</td></tr>
<tr><td colspan="2"></td><td>Perform the pieces in front of an audience (about 40 minutes)</td></tr>
<tr><td colspan="3">30 minutes interview and questionnaires time, in the studio</td></tr>
<tr><td colspan="3">Table 5.5.2 Table illustrating the formal study procedures</td></tr>
</table>

5.6 Data Collection

The study involved three forms of data collection: observations, semi-structured interviews, and questionnaires. Observations were used for identifying the changes the choreographers made to their compositions once an initial structure was formed. The daily interviews with the choreographers were aimed at exposing the rationale behind the choreographers' decisions, and the daily questionnaires captured the dancers' contributions to the structuring process and their perceptions of the daily routines. Notably, quantitative and qualitative data collection and analysis were conducted separately yet concurrently, and the findings were integrated during the interpretation phase of the study (Serlin 2011).

The utilization of observations, interviews, and questionnaires ensured that data concerning structuring could be extracted. Applying multiple methods of collecting data established a triangulation system that sought to build trust in the congruence of the data, reducing the risk of biases (Miles & Huberman, 1984). Methodological triangulation is often used in an "attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint" (Cohen & Manion 2000, p.254). Thus, comparing the data collected by each method provided well-validated and substantiated findings, as it enabled the researcher to thoroughly answer the following questions:

- How were the materials structured and why?
- What changes were made to the compositions and why were these changes made?
- Who was involved in the structuring process?
- What was the effect of using a design strategy?

5.6.1 Interviews & Questionnaires

At the end of each day, the choreographers were interviewed by the researcher (see appendix 4), and the dancers were given questionnaires to fill out (see appendix 5). While the questionnaires had a fixed format, the interviews were semi-structured, meaning that some questions were pre-planned, while others were dependent on the researcher's daily observations and their response to what the choreographers had to say. Having a clear set of instructions ensured that relevant qualitative data could

be extracted and compared later on in the analysis process (Cohen & Crabtree 2006). All interviews were recorded with a video camera and later on transcribed by the researcher for analysis purposes. Each interview involved a set opening whereby the choreographer was encouraged to describe their daily process. Then the interviewer asked about other aspects that were not covered by the choreographer (e.g., What were the reasons for making these changes at the beginning of the piece? Why did you structure the piece this way?). The interview was drawn to a close when all the planned questions were answered and the choreographer had nothing else to add. To ensure nothing was left unexamined, the choreographer was asked if the discussion had missed anything that they wanted to talk about.

Overall, the interviews and questionnaires targeted the participants' experience of the daily tasks and activities. Consequently, they were asked about the construction of the pieces and the differences between them, the types of alterations the composition had undergone, the problems that arose along the way and how they were resolved, who contributed to the structuring process, and how they felt about using the 'nesting' strategy. In addition, the choreographers were queried about their plans, motivations, and artistic values, and on the final day they disclosed which version they were most satisfied with.

This type of methodology positions interviewing as a sound way of generating qualitative empirical data. It assumes interviews can illuminate phenomena that cannot be directly observed (Peräkylä and Ruusuvuori 2011, p. 529), and that through interviews a rich account of participants' experiences, knowledge, ideas, and impressions can be gathered (Alvesson 2011, p. 3). Choreographers' verbal statements often 'show the sense of the artist's actions. That is, they expose the logic embedded in what was done, which the choreographer may or may not have been reflectively aware of during the process itself' (Pakes 2012, p. 59). Indeed, through interviews it was possible to extract information about the reasons behind certain structural decisions, enhancing the understanding of the cognition involved in the structuring stage.

Including the participants' perceptions and experiences of the structuring process allowed for expanding the range of study past the researcher's own individual understandings (Guest 2012), which enabled the drawing of a fuller picture of the structuring stage. By integrating data from interviews, questionnaires, and observations, the research topic was explored with more integrity and objectivity, as it relied on

more than one source. Gathering multiple types of data and using various methods offered a 'crystallization' of findings, supporting the development of a depth of understanding (Richardson 2000, p. 934).

5.6.2 Observations

This study involved observations of the research subjects and the choreographic process in real-time. Still, it was my intention to ensure that "a professional distance" was maintained so that "adequate observation and recording of data" was enabled (Fetterman 1998, pp. 34-35). Therefore, I minimized my interaction with the participants and only communicated with them while giving instructions, answering questions, interviewing the choreographer, and handing out questionnaires.

"A major advantage of participant observation is that you get fresh impressions, right as things happen. You can see how the experience evolves, how the impressions change, how people navigate a situation" (Morrison 2002, p. 31). By observing the creative process in full and in its natural setting, it was possible to experience first-hand the evolution of each dance piece while detecting the intricacies and nuances involved in such a complex process. Moreover, observing the process allowed for constructing relevant questions for the interviews with the choreographers, and it enhanced the researcher's understanding of why certain decisions were made, which gave more validity to the data analysis.

6. Treatment and Coding of Data

In the previous chapter, the research methods and the study procedures were explained in detail. Moving forward, in this chapter, I illustrate how data extracted from observations, interviews, and questionnaires was sorted and analyzed. First, I describe how data from observations was extracted and arranged to provide quantitative information about strategy use, and then I show how qualitative information pooled from interviews and questionnaires was organized. Ultimately, the data analysis was aimed at meeting the study's objectives and questions. Therefore, in order to examine the structuring phenomena in depth and with more accuracy, it was approached from different vantage points using a mixed method analysis.

> "Mixed methods research is the type of research in which a researcher or team of researchers combine elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration" (Johnson et al. 2007).

6.1 Quantitative Data

Yilmaz et al.'s (2011) study demonstrates that the application of design strategies can be quantitatively documented using actual design sketches produced within a professional project taking place over an extended period of time. Their use of archival data to analyze transformation in design concepts and their method of quantifying strategy use has inspired the analysis approach of the present study.

As a result, video footage was used to extract, notate, and classify the strategies employed by the choreographers for altering their dance compositions. Consequently, it was possible to quantify frequency of strategy use and the proportions of strategy use per piece and overall. Analyzing video recordings ensured that strategies that might have been disregarded in interviews or during real-time observations could be captured and reported in full.

6.1.1 Recording & Arranging of Data

The study was recorded with three video cameras, and the footage was later reviewed by the researcher. The first day was dedicated to producing movement material, and therefore was not taken into account,

as it did not involve any structuring. On the other hand, the remaining four days revolved around structuring three dance pieces, and as a result every action was noted. Based on the definition of structuring provided in section 1.3, every time two or more sections were combined it was considered structuring, and any change that was made to this structure was described. However, working on a single movement section was considered as form assignment (Yilmaz et al. 2011), as it did not involve sequencing of sections.

Any change to the composition was placed in a table and was described through seven categories. The structure of the table was partially based on Yilmaz et al.'s (2011) heuristics classification. However, it was developed further to suit this study's objectives. The table encompassed Yilmaz et al.'s local and transitional labels (changes within a single concept or changes between two concepts). However, I added a few other categories that could further illuminate the structuring phenomena (e.g., distributed creativity).

Strategy type	**L**	**T**	**D**	**Time**	**Material**	**Description**
Temporal manipulation	1	0	0	19:08	Rollers	Add stillness for both the activating person and followers

Table 6.1.1a The arrangement of strategies extracted from the study.

First, the choreographer's action was described in length in the last column (e.g., add stillness). Then it was determined what type of strategy could best describe it based on the diagram showing possible strategies for varying dance compositions (section 4.3). For instance, adding stillness involves temporal manipulation of dance elements. Therefore, this was noted in the first column. Next, it was decided whether the strategy was local or transitional, and it was marked according to its nominal level (Stevens 1946). If it changed the overall structure it was marked with the number 1 under T and 0 under L, and if it only involved a change in the detail level it was marked with 1 under L and 0 under T. If the decision was made by other participants or came about as a result of a discussion it was marked with 1 under the letter D, which stands for distributed creativity (Kirsh 2011, pg.1; McKechnie & Stevens 2009; Gabora

2000). Nonetheless, if the choreographer made the decision without consulting the dancers, the column titled ‘distributed creativity’ was marked with a 0. The time of the incident was listed in the fifth column, followed by the name of the movement section the choreographer was working on (titles were either given to movement sections by the choreographer or the researcher). Both of these features made it easier to track information when necessary, and the sixth column pointed out which movement sections were changed and reworked the most.

Sorting data according to a nominal scale offered a few advantages. It enabled the calculation of how many times local and transitional strategies were applied, which led to the identification of particular patterns. Comparing the subjects’ use of strategies, it was possible to form a model that explains how expert choreographers structure and vary their dance compositions. Moreover, connections were drawn between the number of strategies used per piece and the time that was invested in constructing it, showing the effect rehearsing time had on structuring.

The table also made it easier to recognize how many changes occurred as a result of the group’s contributions and revealed trends which could be related with particular process strategies. Notably, calling out process strategies was not as straightforward as determining whether an alteration was local or transitional, and thus required a broader perspective and interpretation skills. This is because it was necessary to place each alteration within a wider context. For example, if the data showed the choreographer mostly prioritized changes which enhanced contrast and identified numerous ways for achieving it, it could be concluded that the analyze morphology strategy took effect (achieving the same function in various ways (Yilmaz et al. 2011).

Startegy Type	L	T	D	Time	Matrial	Description
Day 2, vid 1, FL						
manipiulate- quality	1			11:20	juggernaut	internal dance
manipulate- time	1			11:20	juggernaut	be in time with each other
manipulate- time	1			12:45	juggernaut	faster transition between each state
manipulate-space	1			13:25	juggernaut	travel jaggernaut
manipulate- space	1			13:50	juggernaut	after turn face the corner
layer	1			14:25	juggernaut	all go to 0 but mikayla fades to low and builds up
add section, adds a new beginning		1		15:50	juggernaut	start scattered with your own personal dance, build it and travel with it to the circle and then stop together
manipulate- quality	1				juggernaut	body is really relaxed, ravers early morning
manipulate- space	1			27:14:00	juggernaut	Mikayla- don't face in, change direction
manipulate- quality	1			28:17:00	juggernaut	evolution - its always a little bit bigger and a litter bit faster, no steady areas
manipulate- time	1			28:27:00	juggernaut	stop after you reached your max
manipulate- quality	1			29:54:00	juggernaut	move from %100 to the other %100 motif gradually, semaless transition
manipulate- space	1			30:29:00	juggernaut	as you turn, add travel
form assignment				33:00:00	circle phrase	circles phrase+ look+ marking filter
manipulate- quality	1			34:00:00	circle phrase	circles: articulated and small, subliminal, subtelty
manipulate- space	1			35:15:00	circle phrase	Strictland- amaller movement
manipulate - time	1			34:40:00	circle phrase	Fiona and dancer 2 Stay together (timing)
manipulate-space	1			34:50:00	circle phrase	change spacing so that Fiona is infront and everone can follow her
manipulate - space	1			35:56:00	circle phrase	Strictland- smaller movement
manipulate- space	1			36:07:00	circle phrase	stay on your side when lying down instead of on your back
manipulate- quality	1			36:25:00	circle phrase	keep gaze on dancer
Vid 2						
talks through structure				0:00		Mikayla holds position
manipulate- time	1			2:39	juggernaut	add stillness
form assign				13:50		Mikayla crosses through, all turn to face her
form assign				14:06	circle phrase	Use circle phrase to lift of the floor
manipulate- time	1			15:28	jagganot	the focus on Mikayla should change earlier
manipulate- quality	1			15:24	Mikayla transition	keep focus on mikayla
manipulate- space	1			19:40	circle phrase, off floor	make circle smaller
manipulate- space	1			20:00	circle phrase, off floor	don't draw attention to feet, smaller weight transfer
manipulate- quality	1			20:25	Mikayla transition	walk naturally
change of focus				21:00	Mikayla transition	takes on Mikayla's role in order to "feel it" and makes a decision
assign form				36:30:00	circle phrase	audience on chair immitate jaggernaut dancer with upper body
change of focus				40:00:00	circle+ chair	jumps in as one of the dancers
Vid 3						
distributed creativity		1		10:00	circle +chairs	dancers solve a task, come up with material
form assignment				16:00	"	not literal, immitation as a hint
"				26:20:00	"	discuss how to correspond
Vid 4						
form assignment				3:20	circle+ magnify	one does the circle phrase the other exhaggerates their movements

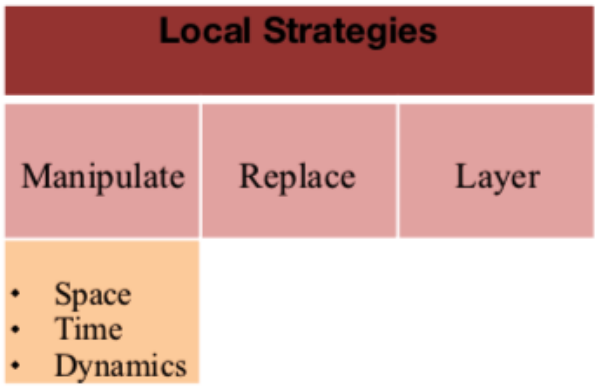
Table 6.1.1b Coding of strategy use observed during the process of Choreographer 2

6.1.1.1 Inter-Rater Reliability

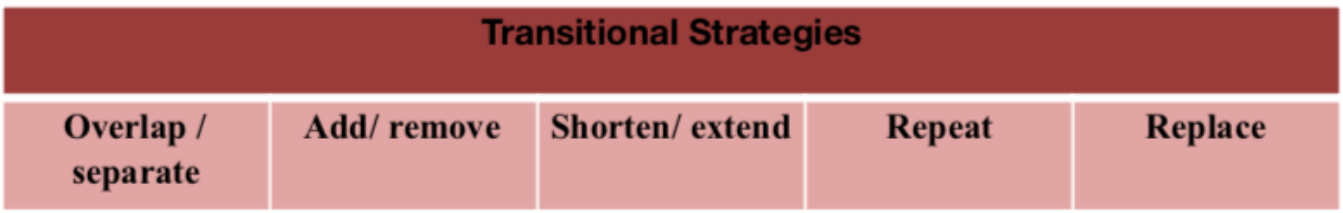
In order to validate the reliability of this coding system, it was independently tested by an external examiner, a doctorate student from Macquarie University. She was trained by the researcher over one day and was then able to map eight hours of footage accordingly[5] (about 12.5% of the overall data). Comparing her coding results and scores with my own, the level of agreement was 70%. This percentage shows a substantial level of agreement based on the Cohen Kappa Inter-Rater Reliability Testing (McHugh 2012).

6.1.2 Grouping of Quantitative Data

Uncovering the choreographers' structuring styles and tendencies required the grouping of similar strategies so that patterns of strategy use could be identified. This resulted in a table of frequency distribution (Manikandan 2011). Each entry in the table contained the count of the occurrences of a particular type of strategy during the construction of each piece and overall.



Strategies were grouped based on the categories presented in the diagram, showing possible strategies for varying dance compositions. Local strategies were divided under three main categories: manipulation, replacement, and layering of elements. However, the manipulation category was further divided into three sub-categories, which included manipulation of time, space, and dynamics as shown in the graph to the right.



[5] The examiner's coding can be viewed at: https://www.dropbox.com/home/The%20Pragmatic%20Nature%20of%20Creativity?preview=coding_SP.pdf

In comparison, Transitional Strategies were grouped under five different categories (all involving large sections): overlap/separate, add/remove, shorten/extend, repeat, and replace.

By grouping similar strategies, it was possible to calculate how many times each strategy was used and how frequently was it applied. This way I could compare strategy use between processes and participants.

6.2 Coding System for Qualitative Information

Interviews, questionnaires, and observations were transcribed before undergoing a thematic analysis. Based on a deductive approach, the analysis was limited to preconceived frames which were determined prior to data analysis (Crabtree & Miller 1999). Using simple but broad analytic codes, it was possible to reduce the data to a more manageable amount (Coffey et al. 1996) based on the research topic and objectives. This means I only extracted information relating to the structuring process and data that could explain the quantitative findings, the effect of the independent variable on the creative process, and the influence of other elements on the choreographers' decisions. These excerpts were distributed under five categories, involving: (1) changes within and between compositions; (2) nesting; (3) favourite version; (4) the dancers' contributions and (5) influences on structuring, such as time.

(1) Changes within and between compositions:

Qualitative data concerning changes within and between compositions was distributed under three categories: local, transitional, and process strategies, and was further sub-divided based on the tables presented in section 4.3. Overall, the content involved the reasons behind the application of certain strategies, and it explained the role process strategies had in

differentiating the compositions from each other.

(2) Nesting:

Qualitative data concerning the 'nesting' strategy was grouped together, demonstrating how the participants felt about this independent variable and how they viewed its contribution to the structuring of the second piece (dependent variable).

(3) Favourite version:

This category captured the choreographers' response when asked to select their favourite piece and their explanations for choosing that particular work.

(4) The dancers' contributions:

This category involved the contributions the dancers made to the structuring of each piece.

(5) Influences on structuring:

The participants' descriptions of the factors that influenced the structuring process (e.g., space, time, music, dancer's level).

Initially, a quantitative analysis was conducted, and in the second stage qualitative information was used to explain the numerical findings concerning strategy use. For instance, if a choreographer mainly manipulated spatial elements, I looked for data that could explain the reasons behind it.

Following this stage, qualitative information was used to describe how the participants differentiated between dance compositions through the use of process strategies. I used Yilmaz et.al's nine categories and looked for examples that could match with each one of them. Methods that did not fit under Yilmaz et.al's framework were added as well, expanding their list of process strategies.

Afterwards, I investigated the effect of the nesting strategy on the structuring process and the effect of time on the use of strategies, ensuring both research questions could be thoroughly answered.
The creative process of each choreographer was analyzed separately. However, eventually, models were compared and were used to generate a single high-level model based on the choreographers' structuring approach.

7. Results: The Structuring Process of Choreographer 1

7.1 Introduction

The previous two chapters described the research methods and data analysis procedures. These methods are the basis for the findings presented in this chapter, which focuses on choreographer Sue Healey and her particular structuring approach. Quantitative and qualitative data was extracted from the study[6] and integrated here with the purpose of providing a more complete view of the structuring process. The data pooled from the formal study was sorted based on the order of the research questions as it appeared first in the literature review chapter. The first part involves a general description of the structuring process of Choreographer 1, linking the structuring phase with multiple strategy use. Following that, there will be a more detailed examination of the strategies applied by the choreographer while highlighting their frequency of use and emphasizing the important role process strategies played in the creative process. Questions 3&4 will be reviewed together, as the data shows a close link between rehearsing time, quantity of strategy use, and quality of outcomes. This chapter will conclude with an analysis of the effect that the independent variable had on the structuring process, including the points of view of the researcher, choreographer, and dancers.

The outcome is a model that describes how Choreographer 1 structures and varies her dance compositions. This model will eventually be compared with the model presented in the next chapter that is based on the structuring process of Choreographer 2. Ultimately, a high-level model will be established showing differences and similarities in experts' use of strategies during the structuring stage. This final model will be further discussed in Chapter 10 in relation to the research questions and in accordance with current literature and research in cognition, dance, and design.

7.2 Structuring and expertise

Observing Choreographer 1 as she was creating three dance pieces made it clear that structuring involves three important stages: making, evaluating, and transforming. The choreographer created a certain

[6] The sorting and coding of the quantitative data can be viewed at:
file:///C:/Users/maya/Downloads/coding,%20sue%20healey%20video.pdf

structure by combining a few movement sections together, evaluated the outcome, and then refined it if needed (at the same time she kept working on separate sections/action units and kept developing them further). Refining the composition was an ongoing process that was enabled through the use of multiple strategies. These helped her overcome a variety of problems that obstructed her from achieving her goals. When she felt that the performance quality was lacking, or when she thought her ideas were not expressed clearly enough, she looked for ways to resolve these issues and explored a variety of solutions. In the following quote, the choreographer clearly describes the type of performance quality she was looking for:

> "It is not about performing steps individually. It is how they sense the whole group, and the whole space. The way the group is moving in the space. When I sense that it works for me, and when the tone feels right. When there is the right level of subtlety. When I sense the awareness to space. When they are spinning that they are orbiting planets. Something much larger than life. But then I also like when they are just humans rather than dancers….The way I really like it is when it is really functional. Very pedestrian but with awareness to subtlety. That's what I'm searching for." (Healey).

Indeed, the choreographer's awareness of her own preferences led her to take actions that advanced her work to match her own standards. This was done by using a variety of strategies that could generally be distributed under two main groups: local and transitional. The former group was applied with the purpose of making minor changes to the composition (without affecting the overall design) and the latter affected the overall structure.

Table 7.2 illustrates the use of local and transitional strategies by Choreographer 1 during the creation of her three dance pieces[7]. The numbers indicate how many strategies were applied per each piece (n), and the percentages (%) show their frequency of occurrence.

[7] Annotated videos of the three pieces can be observed on Vimeo:
P1- https://vimeo.com/272165105 (p.w sue1)
P2- https://vimeo.com/272165261 (p.w sue2)
P3- https://vimeo.com/272165358 (p.w sue3)

Strategy Type		Piece 1	Piece 2	Piece 3	Total
Local	%	86%	75%	86%	83%
	n	69	30	30	129
Transitional	%	14%	25%	14%	17%
	n	11	10	5	26
Total	%	100%	100%	100%	100%
	n	80	40	35	155

Table 7.2 Multiple strategy use by Choreographer 1 during the structuring of three dance pieces

During four days of structuring, Choreographer 1 applied 155 strategies overall, from which about half were applied during the creation of piece 1 (80 strategies), while the rest were distributed almost evenly between pieces 2 & 3 (40 & 35 respectively). The difference in the amount of strategies the choreographer used per piece was probably related to the amount of time she spent on each one of them. Piece 1 took the longest to complete, as its creation spanned over four days. Therefore, the choreographer had more experimentation time, and she could change the composition more often. On the other hand, pieces 2 & 3 were conceived in less time, and that affected the amount of alterations they underwent (the creation of piece 2 spanned over two days and the creation of piece 3 over less than a day).

Interestingly, when looking at the overall distribution of strategies, the choreographer mostly applied local strategies (~83%) and only infrequently applied transitional strategies (~17%). In fact, the numbers reveal that the choreographer applied almost five times more local strategies than transitional strategies (129 versus 26). In pieces 1 and 3, 86% of all strategies were local, and in piece 2 the ratio was slightly lower (75%). The difference in ratios between pieces may be related to the type of problems the choreographer identified in each process. While all processes mostly involved problems that could be resolved locally, some processes encompassed a larger amount of problems that could only be solved by altering the overall structure.

In sum, from interpreting the figures presented in table 7.2, it appears that the structuring process of Choreographer 1 was highly dependent on the use of multiple strategies with a strong inclination towards minor modifications. This tendency enabled her to refine and develop her work quickly and effectively without interrupting the creative flow. Still, when the choreographer encountered a problem that could not be solved locally, she turned to changing the overall structure. However, this only occurred occasionally.

7.3 The application of strategies for structuring and varying dance compositions

In the previous section it was generally explained how Choreographer 1 structured her three dance pieces, tying her process together with the use of multiple strategies, in particular, local strategies. In this section, the type of local and transitional strategies the choreographer applied will be described in more detail while highlighting their frequency of use. Following that, the contribution of process strategies to the structuring process will be clarified by demonstrating how Choreographer 1 utilized them to generate three different dance compositions.

7.3.1 Local Strategies

In all three pieces the application of local strategies resulted in making minor changes to each piece in three ways: manipulating, replacing, and layering elements. These alterations had minimal effect on the overall structure and mainly involved reworking finer details. Manipulating meant the choreographer modified the temporality, quality, or spatiality of movements. Replacing involved replacing one element with another (e.g., a movement with another movement, one formation with another, swapping the dancers' roles). Layering involved adding an extra layer or layers to the composition (e.g., adding a lighting effect, juxtaposing different movement materials, creating new patterns out of existing movement sequences). By applying these local modifications, the choreographer could quickly and efficiently resolve the problems she identified. For instance, by adding a layer of temporary black-outs to the composition, the choreographer was able to disguise repeated transitions (walking from one formation to the next), creating a sense of unpredictability, as each time the lights were turned on the dancers were situated in new formations.

Type of Local Strategy		Piece 1	Piece 2	Piece 3	Total
Manipulate	%	56%	90%	63.3%	66%
	n	39	27	19	85
Replace	%	25%	7%	13.3%	18%
	n	17	2	4	23
Layer	%	19%	3%	23.3%	16%
	n	13	1	7	21
Total	%	100%	100%	100%	100%
	n	69	30	30	129

Table 7.3.1 Use of local strategies by Choreographer 1 during the structuring of three dance pieces

Analyzing quantitative data regarding the choreographer's use of local strategies revealed an interesting pattern. Table 7.3.1 illustrates that out of the 129 local strategies the choreographer used during the formal study, local manipulations were her most favored option (~66%). The largest amount of manipulations was recorded during the structuring of piece 1 (39 local manipulations). However, they were used more frequently during the structuring process of pieces 2 & 3 (P1<P2<P2; ~56%<~63.3%<~90%). The second most-used local strategy in pieces 1 & 2 involved replacement (~25% &~7%), although it was applied about 8 times more often in piece 1 than in piece 2 (17 strategies versus 2). In comparison, layering was the second most-used strategy in piece 3 (23.3%), and it was the least used option in pieces 1 & 2 (19% & 3%).

Overall, differences in strategy use within and between pieces appeared to be related to the particular problems the choreographer identified in each process. As the numbers show, most problems could be easily resolved by applying local manipulations. However, when something did not fit at all, it was replaced with something else. For instance, in piece 1, when the action of the soloist did not contrast the stillness of the group enough, it was replaced twice: once into a wobbly movement and then into a traveling sequence. However, whenever the choreographer's aim was to increase the level of complexity, sophistication, and contrast even more, she relied on layering. Layering was often enabled by

juxtaposing different materials and actions, generating new patterns out of existing phrases, and adding other features like lighting for hiding or exposing the action on stage.

> "I quite like the black out of lighting, just because it is quite an oppositional thing to go from dark to light. A down light appears, especially for the group section, so suddenly they are in a very small space and then open large contrast!" (Healey)

7.3.1.1 Local Manipulations

In order to better understand why the choreographer's most preferable problem-solving technique was manipulating elements, I further divided this group of strategies into three sub-categories that represent different types of manipulations. These involved spatial, qualitative, and temporal manipulations.

Types of Local Manipulations		Piece 1	Piece 2	Piece 3	Overall
Temporal	%	13%	22%	42%	22.5%
	n	5	6	8	19
Spatial	%	72%	56%	47.5 %	61%
	n	28	15	9	52
Dynamical	%	15%	22%	10.5%	16.5%
	n	6	6	2	14
Total	%	100%	100%	100%	100%
	n	39	27	19	85

Table 7.3.1.1 Local manipulation applied by Choreographer 1 during the structuring of three dance pieces

Table 7.3.1.1 illustrates the use of local manipulations by Choreographer 1 during the structuring of three pieces. Altering spatial factors encompassed changing of movement directions, shape, size or level and adjusting traveling trajectories. It also meant some formations were altered, and some phrases were made to travel rather than stay in one spot. In comparison, temporal alterations involved making some movements, phrases, or sections faster or slower, and as a result, longer or shorter. The choreographer regularly seasoned her piece with moments of suspensions and stillness and irregular rhythms and speeds. She worked on the synchronization of group members and sometimes enacted temporal changes

so that the movement could fit with the given soundtrack. In piece 3, the first movement was matched with the first note of the music to accentuate the opening even more, and in piece 2 the piece was condensed to match the time restrictions of the soundtrack. Qualitative modifications, on the other hand, had to do with adjusting the dynamics of certain movements or larger phrases, making some more loose, organic, simple, functional, soft, or sharp with the purpose of fine-tuning the performance quality, creating a richer texture, enhancing contrast and variety, as well as improving connections between movements or larger sections.

This is how one of the dancers experienced these qualitative manipulations and their effect on the piece's transformation:

> "The material definitely changed. Not just the steps, but the quality. I will never forget Sue performing the adage with such pure clarity and then letting what I visually experienced physically impact my own performance. I think the refining of movement we've learnt dramatically changed the movement." (Dancer 1.1)

Interestingly, in Healey's process, most of the local manipulations involved spatial adjustments (~61%). These were used almost three times more than temporal changes and almost four times more than dynamical (14 d<19 t<52 s). Using more spatial manipulations appeared to be related with what the choreographer set as her main focus:

> "Space seems to be the key theme at this point, as it always is. It is always very important to me." (Healey)

Being attentive to the use of space throughout the process, and using it as a tool for expressing ideas was probably the reason why spatial manipulations were used so often. Still, while the choreographer applied this type of local manipulation more than others, its frequency of use differed when comparing the three processes. During the structuring of piece 1, spatial manipulations were used ~72% of the time, and in pieces 2 & 3, it was only about half of the time that these changes were made (~56% and ~47.5%, respectively). Another interesting difference between the three processes was that during the creation of pieces 1 and 2, temporal and dynamical changes were used at a similar frequency (~13% & 15% in piece

Types of Transitional Strategies		Piece 1	Piece 2	Piece 3	Total
Overlap/ Separate	%	36.5%	-	-	15%
	n	4			4
Add/ Remove	%	27.5%	10%	60%	27%
	n	3	1	3	7
Shorten/ Extend	%	18%	40%	40%	31%
	n	2	4	2	8
Repeat	%	-	10%	-	4%
	n		1		1
Replace	%	18%	40%	-	23%
	n	2	4		6
Total	%	100%	100%	100%	100%
	n	11	10	5	26

Table 7.3.2 Use of transitional strategies by Choreographer 1 during the structuring of three dance pieces

1 and ~22% piece 2). However, during the creation of piece 3, the choreographer applied approximately four times more temporal than dynamical changes (8 versus 2).

Differences in the use of local manipulations within and between pieces seem to relate to the particular problems that emerged in each process, as different problems required different solutions. In this respect, some manipulations were applied in order to tackle functional issues, while others were employed with the purpose of enhancing the performance quality. Some alterations were used to create more contrast or variety, and others were aimed at improving the transitions between parts. It was also evident that some changes were only enacted with the sole purpose of satisfying the artist's aesthetic preferences and stylistic inclination. Consequently, the choreographer changed certain movements or sequences to become more simple, pedestrian, or functional.

7.3.2 Transitional Strategies

Observing the creative process of Choreographer 1, it seemed as though some compositional problems could not be resolved locally, and therefore required a change of the overall structure by applying transitional strategies.

Table 7.3.2 illustrates the use of transitional strategies by Choreographer 1 during the four days of structuring her three dance pieces.

Out of the 26 transitional strategies that were used during the formal study, shortening and extending sections was the choreographer's most favored type of structural modification, and it was used almost a third of the time (~31%). In comparison, adding, removing, replacing, overlapping, or separating sections were used less frequently, and changes which involved repeating sections were rarely used (only once).

Comparing the three structuring processes revealed a few interesting differences regarding the use of transitional strategies. During the construction of pieces 1 & 2, the choreographer enacted a similar number of macro changes (10 & 11). However, when forming piece 3, she applied only half of this amount (5 strategies). This makes sense, as the choreographer spent the least amount of time on structuring piece 3 (less than a day). Having less experimentation time seemed to affect her willingness to use a large set of transitional strategies and initiate major structural changes.

Another interesting difference between the three processes had to do with the variety of strategy use. During the structuring process of pieces 1 & 2, the choreographer utilized a larger variety of transitional strategies than in piece 3. When creating piece 1, the choreographer used seven different types of transitional strategies, with overlapping and separating sections being her most-favored option (used 36.5% of the time). In piece 2 she used six different types of transitional strategies, with replacing sections being her most-used method (~40%), and in piece 3 she applied only 4 types of transitional strategies. However, she mostly added or removed sections (~60%). While having more rehearsing time could be the reason why there was more variety of strategy use in the first two processes, interviews and observations show that particular transitional strategies were applied with the purpose of solving particular compositional problems. By changing the overall structure of her compositions, the

choreographer was able to achieve better continuity, enhance contrast within and between sections, develop phrases or ideas further, increase the level of consistency (mostly through repetition), create the opportunity for new progressions, and match the choreography with the soundtrack length. In pieces 1 and 2, it was not until two sections were taken out that the final piece was realized, and in piece 1, removing sections led to finding better transitions as well as cancelling unnecessary repetitions. Hence, it seems as though transitional strategies have an important role in refining dance compositions and in promoting the discovery of creative solutions.

Here is how Dancer 1.3 explains his experience of working on piece 1:

> "We formed what we thought was a decent structure yesterday, even though we had a few unsolved transitions. Today, however, the majority of that structure was altered. We began by creating an entirely new beginning from the ideas and material that appear throughout the piece. Some of the structure stayed the same. However; the new structure gave it a whole new feeling and meaning." (Dancer 1.3)

7.3.3 Process Strategies

So far it has been demonstrated how local and transitional strategies assisted the choreographer in resolving particular compositional problems, and how they supported her in transforming and developing the three works further. Aside from these techniques, the choreographer relied on another group of strategies titled 'process strategies'. These appeared to be strategic choices the choreographer made for forcing changes in a specific direction (based on Yilmaz et al.'s 2011 definition of process strategies). For example, by prioritizing the theme of the piece, 'polarities', the choreographer continuously made changes that enhanced opposition between and within sections or elements. In this sense, process strategies not only enabled the choreographer to shape each composition into its 'final' form, but they also allowed for generating three distinct dance structures with particular characteristics and identity. The types of process strategies the choreographer applied during the formal study are explained in more detail in the sections below.

- **Evaluate**

Putting so much emphasis on the theme of the piece, 'polarities', Choreographer 1 kept increasing the contrast both within and between sections, evaluating this constraint far above any other and using it repeatedly as a major editing force. Her purpose was to establish radical shifts that could be clearly read by the audience. In the following statements she explains her intentions:

> **"**I am looking for contra patterns, patterns that are opposing each other; I just want to keep playing with that….I want to create oppositions in space, so I want to get that front back, these sides... I want these bodies to move in various oppositions as well as the physical opposition that they have in the material." (Healy)

> **"**I want to play with more opposition in the space ... So that crossing to the other side of the room, what it does to us as observers seeing the big switch of opposition in space and strength and power of placement in space…" (Healey)

Below she describes structuring the first piece based on the opposition and contrast constraint:

> "I guess I'm always going for contrast and opposition. So if I start with someone at the background I want to have a group at the foreground. If I use the whole space, I then want to use a very small closed space. From that I go to the wide space to a very individual space where they are on their own balance points, their own poles. That whole thing has a sense of switching as if the whole world has turned over and you can see it from the other side. We then go to foreground and background and height levels and all the intricacies of that phrase material that is all about the different poles of the body... Dynamic opposites as well, some stillness, some soft fluidness and some more pushed. Then it breaks again into foreground/background with the four on the wall and Dancer 1.3 is doing this big traveling in reaction to the stillness at the back. The two, two and the one, again the sense of the space opening, being opposition." (Healey)

The dancers were also aware of the choreographer's tendency to emphasise the elements of contrast and opposition in her pieces:

"The order was determined primarily by spatial relationships to create polar opposites. i.e. the next section would show polarity from the last in terms of spatial relationships between dancers and it would change in movement quality…by using contrasting movements and distinguished groups the polarity between dancers is demonstrated. There were significant changes of structure from yesterday in order to smooth out transitions and emphasize opposition. However, the fundamental structure of continuously shifting dynamics remained the solid base. This gave a clear focus whilst allowing the freedom of switching sections entirely, removing sections, and adding sections without affecting the authenticity and clarity of polarity." (Dancer 1.5)

Notably, what enabled the choreographer to really distinguish her three pieces from each other, despite prioritizing the idea of polarities, was her ability to represent this theme in so many different ways. Thus, constructing three unique landscapes of polarities.

- **Form Assignment**

Form assignment involves giving form to movement sections or units and then looking for ways to link them together. During the first day, the choreographer constructed a number of action units. These action units were further developed and manipulated throughout the four days of structuring as the choreographer explored their functional possibilities and considered which parts could be juxtaposed. Notably, while some forms made it into the final composition, others were left out completely. Still, giving ideas a physical form seemed to be an important stage of the process, as it allowed the choreographer to see whether something worked or not. As some of the dancers explained:

"As the day progressed we found our interpretations evolving, which often altered the nature of our movement material. This was exciting to solve and overcome, as it allowed for a whole new range of movement and ideas." (Dancer 1.3)

"We had so much material, but then shifted it into completely different phrases. We ended up chopping some material and performing it in different directions or elsewhere in the room or in different times or with more or less dancers. The experimental process was most effective to Sue, yet there is still more experimentation to do." (Dancer 1.1)

> "We did not work sequentially to organize the form. It was made bit by bit, then we joined these bits together, contrasting each section in terms of space and physicality." (Dancer 1.2)

Changes to the original units were implemented for different reasons: generating a more complex and sophisticated composition, creating more variety in cases where these units were repeated, breaking the predictability of certain events, and improving the integration of sections. Yet, no matter what sorts of changes were made, they always seemed to correspond to the piece's theme, and therefore more contrast and opposition were introduced at all times. Consequently, formations, movements, and relationships were altered, while layers were added and patterns were further developed.

Reshaping the original materials made each piece distinct. For instance, the traveling sequence was performed in different pieces in various arrangements: a solo which was backed up by a group in stillness, duets in which one dancer manipulates the other, as well as a group canon and unison.

After units were established, the choreographer looked for ways to link them together. Still, they continued to evolve and change even when they were placed as part of a sequence. She explains this process as such:

> "It is much more jumping through time and different ideas until things settle. So I enjoy the process of not worrying about that and just knowing that I would find the right beginning and the right ending and the right sense of transitioning through." (Healey)

- **Analyze morphology**

The choreographer seemed to be highly skilled in inventing numerous ways of achieving the same function. This was particularly apparent in the way contrast was achieved. Hence, the original materials were continuously reorganized and juxtaposed, forming new oppositional structures. This enabled the creation of three distinct compositions, despite the restriction of using the same movement material. Generally, contrast was achieved in three ways: manipulating the original movement materials in term of space, time, and dynamics, finding opposing relations between the dancers, and juxtaposing different sections, overlapping or attaching them.

One example of the ‘analyze morphology’ strategy was evident in piece 3, wherein the use of a prop took on a new form. In piece 1, three dancers were holding foam rollers and manipulated them slowly at the back of the room while a more dynamic duet was taking place at the front. However, in piece 3 one dancer was pushing the rollers on the floor while the other 4 dancers were following the objects’ movement and trajectory. Hence, the function of using a prop and achieving contrast was apparent in both pieces, though it took a completely different form.

- **Prioritize**

Creating three dissimilar pieces required deviating away from past decisions. This was made possible through prioritizing a different set of constraints for each process. These principles affected the selection of materials as well as influencing how they were performed and juxtaposed. For example, when creating piece 1, the choreographer stated: “I want it to be really tricky and quirky and rhythmic, so we’ll need to do a lot of work on that.” (Healey) But when creating piece 3, the principle of rotating around an axis became the main priority.

Another tactic for varying dance structures was making different materials the main focus of each piece. Prioritizing certain materials, repeating and reshaping them, gave each piece a particular essence.

For instance, piece 1 included the largest number of action units, and therefore appeared more varied and sectionalized than the other two pieces.

> “The first piece is much more structured and sectionalized; this one (piece 2) is a bit more fluid and amorphous.” (Healey)

- **Synthesize**

Merging different concepts together has also been proven to enhance variety between compositions as well as boost productivity and creativity. When different materials, constraints, or ideas were combined, new forms of organization were created, which supported the choreographer in differentiating one piece from the other. For example, the concept of contrast was integrated in piece 3 with the idea of rotating

around an axis. This then took on many interesting forms that enabled piece 3 to have its own content and structure.

- **Propagate**

At times, the choreographer identified a certain concept and reapplied it in other works. For example, the ending of piece 1 was proliferated into the others and ended up concluding the three pieces.

> "The one motif that I keep coming back to, the balancing on the moon, I love that feel, this is the image, the individual versus the world, this polarity of human versus nature." (Healey)

Propagating this element over and over again demonstrated how strongly the choreographer felt about it. Still, each time it reappeared, it was staged in a new way. In piece 1, one dancer remained on stage, balancing on the balls of her feet, as the others gradually left the space as a group. Piece 2 came to a conclusion as four dancers exited to four corners, leaving the main dancer centre stage to slowly amplify the velocity and volume of his movement. Piece 3 involved the dancers moving in close proximity, with some performing the 'moon balance' and the others rolling on the floor, while traveling backstage.

- **Switch of focus**

The choreographer's shift of focus from a general system level to specific concept element and back allowed her to effectively instill change both in the micro and macro level. In fact, after spending time on a certain alteration or development of a particular movement or a phrase, the choreographer had the habit of running the piece from the beginning, shifting from focusing on one section or detail to perceiving the piece as a whole. This shift of focus allowed her to sense whether her sequencing was effective, and to make further changes when necessary by employing local and transitional strategies. Notably, the choreographer also kept shifting her focus between the three works, ensuring that past decisions were avoided or altered so that new forms could be conceived.

- **Contextualise**

Assigning a different context or contexts per piece enabled the choreographer to deviate away from previous works and re-organize the same material in a new way. For instance, before commencing piece

3, the choreographer indicated she would like to create a more mathematical composition, where she would experiment with intricate patterns and canons. Furthermore, after creating piece 1, she looked into exploring other movement qualities and especially more pedestrian and functional qualities. As she explains in one of the interviews:"What I'm doing here is what I do in all the processes, I renegotiate material and shift it into a new context and into a new form…I can keep building a store of vocabulary and ideas under one framework. Be it space, or time, or form, or portraiture, it just gives me this great wealth of material to play with, finding new combinations and evolutions through it." (Healey)

- **Brain-write**

Through brainstorming sessions, the participants were able to come up with new constraints, ideas, and new variables to focus on. The choreographer often turned to the group when she had no immediate solution. As a result, the group discussed different possibilities concerning the structure of the piece, its transitions, and its development. Group members suggested that unused material be integrated into pieces 2 and 3. They came up with ideas as to how a prop might be taken offstage, how to condense piece 3, as well as proposed different endings for the piece.

> "Even if I do not implement it (the dancers' input), it is helpful to hear what they feel, what they need to do or want to do. Because I can see things from a different perspective, I do not necessarily act upon it, but it helps me. It's a really good thing, and I encourage that and want to encourage that more." (Healey)

On a few occasions, the dancers were asked to solve problems on their own by manipulating existing materials based on her instructions. Some of these were eventually integrated into the piece. For example, in piece 1, two sequences (traveling sequence and spinning cross) were readapted into a duet format, wherein the dancers manipulated each other while remaining in close proximity.

> "We were given a few improvisational tasks in order to physicalize our own interpretation of the concept. We were also given the opportunity to produce a phrase of our own and to learn and improve upon phrases created by Sue." (Dancer 1.3)

7.4 Rehearsing Time, Strategy Use, and Quality of Outcomes

One goal of investigating the structuring process was to uncover how rehearsing time and quantity of strategy use affect the quality of the final outcome.

Comparing the length of time the choreographer spent on structuring materials with the data presented in table 7.2, it appears that the more time invested on constructing a piece, the more changes were enacted. Piece 1 took the longest to complete, as it spanned over the course of four days. Therefore, it involved the highest amount of strategies overall (80). By comparison, less time was invested in structuring pieces 2 & 3 (the creation of piece 2 spanned over two days, and piece 3 took less than a day to complete). Therefore, fewer strategies were applied during these processes (40 and 35 strategies respectively).

In order to clarify whether the application of more strategies supports a better outcome, in the last day of the study the choreographer was asked to reveal which of the three pieces she was most satisfied with. Her answer indicated that piece 1 was her most favored option. She explained that in the first process she had enough time for proper problem solving, and she was much happier with the solutions that were found. Thus, from her answer, it seems as though the amount of time spent on a piece, the number of alterations it undergoes, and the quality of the creative outcome are all correlated.

7.5 Explicit Strategies and the Structuring Process

One of the study's aims was to examine the effect of explicit strategies (strategies choreographers consciously use) on the structuring process, and to test whether it could enhance productivity and creativity during this stage. Therefore, after completing her first piece, the choreographer was introduced to the 'nesting' strategy (Hide/Collapse/Flatten two elements within each other), and was asked to incorporate it into her second process.

Consequently, nesting appeared in piece 2 in two sections, showing two different movement materials that were synthesized together. In both incidents, nesting took a similar form, wherein the group moved around one dancer who was performing a different set of materials from them. It was hard to say whether this outcome could be considered creative, as a similar structure was already used in piece 1 (a circle of dancers that moved around the odd dancer). Unexpectedly though, some nesting structures that

were not integrated in piece 2 eventuated in piece 3. This made the nesting effect last beyond what was expected. In piece 3, nesting was applied through a line of dancers who swayed and spiraled as they stood connected to each other. This form of nesting could be considered original, as it was not applied by the choreographer before.

In order to evaluate whether the application of the 'nesting' strategy was useful, the participants' reactions were recorded at the end of day 4, and the comments they made in their interviews and questionnaires were analyzed afterwards. Initially, the choreographer described her experience with the 'nesting' strategy as such:

> "I am trying to think about it. I haven't got a way in yet. I did not have immediate thoughts about it, but I'll tackle it now…. I need to uncover a bit more the specifics of the nesting thing." (Healey)

From this quote, it seems as though the strategy did not trigger instant associations or ideas. However, later in the day, 'nesting' found its way into the piece quite easily as some of the dancers described:

> "As the day progressed, and piece 2 came to fruition, I began to notice nesting popping up where we had not originally intended. I think once we let go of the effort to find a flow and create nesting it happened naturally." (Dancer 1.3)

> "I actually found that nesting came naturally (by) finding new ways of using the material. E.g., moon balance was made to look completely different by disguising it with a walking pattern. I think this manipulation strategy came quite naturally (while) developing a second and contrasting piece, but now we were just familiar with its name: nesting."(Dancer 1.5)

> "Transitions were made easier through the nesting technique because movement was transformed into traveling material more creatively." (Dancer 1.5)

Interestingly, while the dancers thought 'nesting' came quite naturally and without conscious effort, the choreographer perceived it more as a burden, especially at the beginning of the process. Yet, with time

she became more in favour of its outcome, especially when it came to piece 3. At first she described her experience with the strategy as such:

> "To be honest it did not generate any new ideas…I wanted more bodies. If I could have a couple more bodies…I could have 'nested' a lot of stuff and doubled up, but using the same number of bodies, I was trying to find ways, but it hasn't quite worked because of time issues. Or maybe because it is something I do not often think of… I'm trying to think about the nesting thing…but I'm not sure how successful that has been." (Healey)

However, later on in the process, during the creation of piece 3 and after the construction of the 'nesting line', she said:

> "I like the polarity of that, of the opposing hands and energy swiping in a different way. The idea is still quite special." (Healey)

These statements demonstrate that despite the restrictions, the choreographer managed to incorporate the 'nesting' strategy into her work, and she appreciated the result. Still, this process required much thought and experimentation.

In retrospect, it did not seem as though the use of an explicit strategy contributed to the process that much. This is because the choreographer already had a large variety of strategies for structuring and varying her dance compositions. Therefore, adding an extra strategy did not make much of a difference. If anything, it seemed to divert her attention away from the path she was on (even though she appeared to eventually get used to it). That said, using explicit strategies may be useful in situations of blockage and fixation, and may serve novice choreographers who are still in the process of building their choreographic tool-kit.

8. Results: The Structuring Process of Choreographer 2

8.1 Introduction

In the previous chapter, the structuring process of Choreographer 1 was explained in detail. However, in this section, the particular structuring approach of Choreographer 2 is discussed (the outcomes can be viewed on Vimeo[8]). Overall, quantitative[9] and qualitative data pooled out of the formal study was treated and analyzed similarly to the first choreographer, ensuring biases were minimized when comparing the participants' structuring methods.

8.2 Structuring and expertise

The structuring process of Choreographer 2 involved the same procedures that were carried out by Choreographer 1. He created a certain structure by combining different sections together, evaluated the outcome, and altered or refined the composition by using multiple strategies. Table 8.2 illustrates the use of local and transitional strategies by Choreographer 2 during the formal study. Altogether, he applied 134 strategies, from which the majority involved local changes (~90%) and the minority transitional (~10%).

Strategy type		Piece1	Piece2	Piece3	Total
Local	n	65	32	24	121
	%	96%	91%	77%	90%
Transitional	n	3	3	7	13
	%	4%	9%	23%	10%
Total	n	68	35	31	134
	%	100%	100%	100%	100%

Table 8.2 Use of multiple strategies by Choreographer 2 during the structuring of three dance pieces

[8]Annotated videos of the three pieces can be observed on Vimeo:
P1- https://vimeo.com/271568394 (p.w gideon 1)
P2- https://vimeo.com/271581961 (p.w gideon 2)
P3- https://vimeo.com/271579540 (p.w gideon 3)

[9] The sorting and coding of the quantitative data can be viewed at: https://www.dropbox.com/home/The%20Pragmatic%20-Nature%20of%20Creativity?preview=gideon+quantitaive+info+table.pdf

Out of the 134 strategies used overall, about half were utilized during the structuring of piece 1 (68 strategies), and the other half was divided almost equally between pieces 2 & 3 (35 & 31 strategies respectively). This difference in numbers could be related to the amount of time Choreographer 2 spent on each piece. Piece 1 took the longest to complete, as its creation spanned over three days. Therefore, he had more time to change and refine the composition. On the other hand, pieces 2 & 3 were conceived in less time, and that affected the amount of alterations they underwent (the creation of pieces 2 & 3 spanned over two days each).

Examining the distribution of local and transitional strategies in all three processes, the numbers reveal that local strategies were applied more often than transitional strategies. However, in pieces 1 & 2 the choreographer applied local strategies more than 90% of the time, and in piece 3 only 77% of the time. In terms of transitional strategies, the numbers show that during the structuring process of piece 3, the choreographer changed the overall structure more than twice as much when compared to pieces 1 & 2 (7 versus 3). The difference in ratios of local and transitional strategies between pieces may be related to the types of problems the choreographer identified in each process. While all processes mostly involved problems that could be resolved locally, some processes encompassed more problems that could only be solved by altering the overall structure.

In sum, from interpreting the figures in table 8.2, it appears that the structuring process of Choreographer 2 was highly dependent on the use of multiple strategies, with a strong inclination towards minor modifications. This tendency enabled him to refine and develop his work quickly and effectively without interrupting the creative flow. Still, when the choreographer encountered a problem that could not be solved locally, he turned to changing the overall structure. However, this only happened occasionally.

8.3 The application of strategies for structuring and varying dance compositions

In the previous section, it was generally explained how Choreographer 2 structured his three dance pieces, tying his process together with the use of multiple strategies, and in particular local strategies. In this section, the type of local and transitional strategies the choreographer applied will be described in

more detail while highlighting their frequency of use. Following that, the contribution of process strategies to the structuring process will be clarified, demonstrating how Choreographer 2 utilized them to generate three different dance compositions.

8.3.1 Local Strategies

In all three pieces the application of local strategies resulted in making minor changes to each piece in three ways: manipulating, replacing, and layering elements. Each method supported the choreographer in solving different types of problems, and that is why their frequency of occurrence differed both within and between processes.

The results in table 8.3.1 show that out of the 121 local changes that were applied over the three processes, the majority involved manipulation of elements (~79%). In fact, it was only ever so often that the choreographer chose to replace (~12%) or layer elements (~9%). In all three processes manipulation was the most favoured option (P1: ~86%, P2: ~72%, P3: ~71%), followed by replacement second (P1:~8%, P2: ~16%, P3:~17%), and layering third (P1: ~6%, P2: ~12%, V3:~12%), with pieces 2 & 3 showing similar ratios of strategy use (about 0.70 M : 0.20 R : 0.1 L). Notably, the highest number of manipulations was recorded during the structuring of piece 1 (56), and it was by far the most favoured option for instilling change in this particular process (86%).

Overall, differences in strategy use within and between pieces appeared to be related to the particular problems the choreographer identified in each process. As the numbers show, most problems could be easily resolved by applying local manipulations. However, when something was a complete misfit, it was replaced with something else. By swapping formations, trajectories, positions, roles, and movements the choreographer could improve the dancers' synchronicity, increase the piece's consistency, maintain a sense of flow, simplify elements, ensure that the integrity of the performance is kept, enhance the functionality of elements, or contrast them.

Still, whenever the choreographer's aim was to increase the level of complexity, sophistication, and contrast even more, he relied on layering. In the first piece, layering elements involved adding a task

whereby the dancers were asked to follow the soloist with their gaze while performing different movements than hers. The 'gazing' idea was propagated into other sections of the piece, which not only helped in establishing clear relationships between the dancers, but also enhanced the consistency of the piece. The choreographer explains that the 'gazing' group "helps us recognise moments" like the "ridiculous dance" that the soloist performs, emphasizing its meaning even more. "The inspiration is what she's doing, recognizing it for what it is, and then saying how can I make more of that." (Obarzanek)

Another form of layering was applied in the second and third pieces. The choreographer decided to add the audience as another participant in the composition. In the second piece, their gestures were more pedestrian, creating a psychological space and ambiguity, as they seemed to respond to the action on stage. However, in the third piece, the outcome was less dramatic, as their gestures were imitative of the dancers' movements, which seemed like a dance for the arms and upper body.

The solo performer in the second piece was also dressed in many layers, which the dancer slowly removed. This process created the impression of a psychological journey, whereby the main dancer is going through various states. To begin with, the solo combines a circular phrase, shaking and reversals, as well as slow and closed movements. However, gradually, the pace increases, and the movement becomes bigger and more open, revealing the circular phrase in its purest form. This created a "very interesting and emotive" (Dancer 2.1) outcome which the choreographer was very excited about. As he describes: "If it was just shaking, so yea you get it. But when you add another task… we understand that they (the dancers) are working towards something.They are occupied with a purpose….the performer has that as a motivation, as a journey, as a pathway….I felt like I was seeing something new, which does not happen very often." (Obarzanek)

8.3.1.1 Local Manipulations

Since the choreographer demonstrated a high tendency to solve problems by applying local manipulations, in this section this method will be reviewed in more depth. In all three processes, the application of local manipulations affected the use of time, space, and dynamics in existing structures. These alterations made the choreography more defined, focused and purposeful.

Types of Local Manipulations		Piece1	Piece2	Piece3	Total
Temporal	n	25	16	7	48
	%	45%	70%	41%	50%
Spatial	n	21	3	7	31
	%	37%	13%	41%	32%
Dynamical	n	10	4	3	17
	%	18%	17%	18%	18%
Total	n	56	23	17	96
	%	100%	100%	100%	100%

Table 8.3.1.1 Use of local manipulations by Choreographer 2 during the structuring of three dance pieces

Table 8.3.1.1 shows that during the five days of the formal study, the choreographer applied 96 manipulations, from which half involved temporal adjustments (48), about third were spatial (31), and the rest dynamical (17). Still, even though temporal manipulation was the choreographer's favourite method, its frequency of use differed when comparing the three processes. While the highest number of temporal changes was registered during the structuring process of piece 1 (25 versus 16 & 7), they were used more frequently in piece 2 (~70% of the time as opposed to ~45%), and in a similar frequency in piece 3 (~45% & ~41% of the time). In fact, during the construction of piece 3, the choreographer applied the same amount of temporal and spatial alterations (7 strategies), and in piece 2 the amount of spatial and dynamical changes was similar (3 and 4 strategies). And so, analyzing the distribution of local manipulations within and between processes, pieces 1 & 3 show a similar ratio (about 0.4 temporal: 0.4 spatial: 0.2 dynamical), while strategy use in piece 2 was different (about 0.7 temporal: 1.5 spatial: 1.5 dynamical).

Variations in the use of local manipulations within and between pieces seem to relate to the particular problems that emerged in each process, as different problems required different solutions. Some manipulations were applied in order to tackle functional issues, while others were employed with the purpose of enhancing the performance quality. Some alterations were used to create more contrast or variety, and others were aimed at improving the transitions between parts or at satisfying the aesthetic preferences and stylistic inclination of the choreographer.

- **Temporal Manipulations**

By applying temporal modifications (e.g., adding or removing stillness, changing the movements' speed or duration, and shifting the point where a movement or a phrase should start or stop), the choreographer could establish better synchronicity, precision, clarity, flow, variety, and contrast.

For example, in the first piece, the choreographer was trying to establish a clear relationship between the dancers, giving each part a particular context and mood. In one part, the choreographer's intention was to augment the 'creepy' quality by intensifying the differences between the group and the solo performer. Hence, he continuously asked the group to perform their circular phrase as slowly as possible as they intensely observed the other dancer, whose movements build up in speed, eventuating in an exaggerated juggernaut. Afterwards, in an interview the choreographer explains:

> "Speed is related to the motivation of the performer, what they are thinking about at the time. Speed sounds simple, but actually it shifts the piece and what their engagement is." (Obarzanek)

And so, from this quote it is clear that by adjusting temporal elements such as the movements' speed, the choreographer was able to give more meaning and purpose to his work.

- **Spatial Manipulations**

Spatial modifications involved changing the movements' size, height, direction, and trajectory. Some sequences were made to travel in space as opposed to staying in one spot, and in some incidents the dancers were instructed to emphasize a particular body part while dancing. By instilling these changes, the choreographer was able to achieve a better sense of evolution and transformation, more contrast and variety, and increased consistency. Moreover, he could refine the dancers' precision and synchronicity and express his ideas with more clarity.

One aspect the choreographer was consistently rethinking was the spatial relationship between the dancers and the audience. This is because the audience chairs were organized in two lines facing each other. In piece 2, the dancers were asked to sit on tall boxes, as opposed to standing behind the audience. And so, by elevating the dancers off the ground, their movement could be easily seen by the viewers on

both sides of the room. In comparison, in piece 3 the performers were made to constantly shift directions, as opposed to facing only one direction. This enabled the viewers to experience the performance from different perspectives.

- **Dynamical Manipulations**

Dynamical alterations encompassed making movement more internal, relaxed, subtle, pedestrian, smooth, natural, and simple. Often the intention was to stay true to a certain context or image (e.g., ravers at the end of a long party), to sustain the sense of movement evolution (starting softly and building up to explosion), to remain consistent (keep following the soloist with your gaze), to establish smoother transitions between movements, to encourage a more natural performance as opposed to demonstrative or theatrical, and to maintain a sense of flow.

8.3.2 Transitional Strategies

Observing the creative process of Choreographer 2, it seemed as though some compositional problems could not be resolved locally and therefore required a change of the overall structure. This was accomplished by applying transitional strategies. Table 8.3.2 illustrates the use of transitional strategies by Choreographer 2 while structuring his three dance pieces.

Types of Transitional Strategies		Piece 1	Piece 2	Piece 3	Total
Overlap	n		1		1
	%		33%		8%
Add/ remove	n	3		4	7
	%	100%		57%	54%
Extend	n		1	1	2
	%		33%	14%	15%
Repeat	n		1		1
	%		33%		8%
Replace	n			2	2
	%			29%	15%
Total	n	3	3	7	13
	%	100%	100%	100%	100%

Table 8.3.2 Use of transitional strategies by Choreographer 2 during the structuring of three dance pieces

Altogether, the choreographer initiated 13 transitional changes, which affected the macro structure of the three pieces. The figures show that the choreographer mostly removed or added sections (more than half of the time), occasionally extended or replaced sections (~15% of the time), and only rarely overlapped and repeated sections (each method was applied only once).

Interestingly, during the structuring process of piece 1, the choreographer applied only one type of transitional change (adding and removing sections), while in pieces 2 & 3 the types of transitional changes were more diverse. In piece 2 the transitional change involved overlapping, extending, and repeating sections (1 of each), and in piece 3 more than half of the changes involved adding or removing sections (~57%), about a third involved replacing sections (~28.5%), and the option of extending a section was only used once.

Surprisingly, even though piece 3 took less time to complete than the other two pieces, the choreographer applied more transitional strategies during its structuring process. In fact, he changed the overall structure more than twice as much in piece 3 than in pieces 1 & 2 (7 times as opposed to 3 times). This shows that time limitations did not hinder his willingness to make major structural changes, although they required more thought and time. While it could be that piece 3 involved more problems that required major structural changes when compared to the other two, it could also be that becoming more familiar and comfortable with the dancers and the situation allowed the choreographer to experiment with the structure more and take more risks.

Observations and interviews reveal that transitional strategies were put in place for different reasons. They allowed for testing different openings. They reduced the number of repetitions a phrase was performed, created smoother transitions, and enhanced contrast and complexity within sections. In addition, by applying transitional strategies, the choreographer was able to remove unnecessary parts and keep only what he thought was relevant for the piece. He could explore better progressions and expand on certain ideas that he only touched upon briefly.

8.3.3 Process Strategies

So far it has been explained how local and transitional strategies support the structuring process. These strategies allowed for resolving particular compositional problems and enabled further transformation and development of the choreography. Still, aside from these techniques, the choreographer relied on process strategies. These allowed for generating three distinct dance compositions with particular characteristics and identity despite relying on the same movement materials. The types of process strategies the choreographer applied during the formal study will be explained in more detail in the section below.

- **Contextualise**

Choreographer 2 built each piece around a different context. The first piece focused on the group's relations and on exploring movements' extremities (small versus big, slow versus fast). The second work featured a psychological journey wherein a dancer slowly rids herself of certain inhibitions, and the third piece showcased symmetrical and formal forms. Pieces 2 & 3 also involved audience participation. However, in piece 2 the viewers performed pedestrian gestures, and in the other the audience's movements reflected those of the dancers.

The following quote demonstrates how the choreographer views the differences between pieces 2 & 3:

> "Piece number 2 is more gestural. It has more of a human psychological space because there is a single individual. They are shaking. People are putting their hands on their chin…so you see these images of people and concern. It has multiple meanings, where piece number 3 it is not that. The people in the middle are clearly doing choreography because it is symmetrical. We are not invested in what this person represents or what they are going through, and the movement the audience is doing is very much a movement sequence. That is continuously reinforced in piece number 3. The canon makes it very much a formal dance. It is working in the traditional sense of how we normally understand dance to be: steps in time. I have slight personal issues with it because this kind of dancing often does not interest me as much, so I'm looking at it going, oh that is very familiar to me. That's something I've seen, I understand, I'm not interested in doing,

but I could not think of anything better at the time, so I went with it. It is actually quite nice." (Obarzanek)

- **Analyze Morphology**

The choreographer has managed to find multiple ways to achieve the same function through the application of what he calls 'filters'. These enabled him to present the same concept in different forms. For example, the concept of circularity kept appearing in all three pieces, yet in different variations each time. In piece 1, the circular phrase was performed in a very minimalistic fashion as four dancers observed another dancer who was executing her own personal juggernaut. In the second version, the same phrase was danced by a soloist who was traveling on a curved line. At first she shook and retracted. However, later the circular phrase becomes more defined, continuous, and fast. In piece 3, the circular phrase was performed by two dancers who held hands, and thus establish a more intimate relationship. Later on, these were joined by two other dancers, and they all performed a very intricate canon. Notably, while in the first two pieces the circular phrase was used to emphasize a more human aspect, in the third piece it was based on symmetry and appeared more 'dancy'.

Another function that manifested differently was the audience participation. In piece 2, their movements were more gestural and human, and in piece 3, they were imitative of the performers' dance movements.

Contrast was an additional element that was evident in the three pieces, yet in each piece it was achieved in different ways. In piece 1, contrast became obvious through shifting between movement extremities (small and slow versus big and fast), and through juxtaposing actions which differ in quality and size (circular phrase versus juggernaut, stillness versus movement). In the second piece, contrast became visible due to the polar nature of the solo. Its departure point was fragmented, slow, and shaky. However, its ending was continuous, circular, and fast. The experience of the space also shifted dramatically, as at times it was charged by the movement of the whole cast, and at other times it was occupied by a single dancer whose actions were juxtaposed to those of the audience. In the third piece, the dancers faced opposite directions and afterwards performed a canon. The audience's movements contrasted those of

the dancers by having different timing and body use (the viewers were sitting down, using their upper body only).

- **Prioritize**

The choreographer's main intention was to create three distinct dance versions. This meant his main constraint was to deviate away from past choices. As a result, he prioritized a different set of limitations per piece, which aided in forming three particular contexts and structures. In the second piece, the focus was on representing a clear transformation through time, and in the third piece, symmetry became the main constraint. Audience participation was another element the choreographer focused on in pieces 2 & 3. However, its manifestation created a very dissimilar effect.

By comparison, the first piece involved particular group relations and explored movement extremities.

> "The end of the piece builds in pace and becomes more frantic. I think it is definitely polar opposite to the start." (Dancer 2.5) "It is derived purely from variations on opposite polarities (i.e. high/low intensity, fast/slow, sitting/dancing). It is very abstract and has little logical patterning or narrative." (Dancer 2.1)

Being restricted to using the same movement material meant the choreographer had to look for various forms in which it could be used. Thus, the circular phrase (which appeared in all three versions) was manipulated under various rules into different forms. It was minimized, travelled, layered, sped up/ slowed down, and danced in different levels. Each piece revolved around particular choices, which led to associating the three of them with a specific movement quality:

> "This (second) piece is very different from the last one, as its movement quality differs greatly. Yesterday's piece (piece 1) had a very playful energy, which created a euphoric vibe, but with the addition of shaking the vibe of today's work was a bit more traumatic." (Dancer 2.3) In the third piece "the dynamics have changed" again and therefore it affected "how things are read dramatically." (Dancer 2.2)

Notably, aside from preferring certain contexts and movement qualities, the choreographer assigned a different structure for each piece: an AB structure for Piece 1, with the first part involving a juggernaut and the second circular phrase, an ABA structure for Piece 2, encompassing group section, a solo and a repetition of the group section, and in Piece 3, an ABC structure starting with a duet, continuing into a group cannon, and finishing with the personal juggernaut. The choreographer explains that the third piece has "More of a formal structure. It takes elements and puts them into patterns. But what is nice is that at the end of that formal dance, they start to do their own dance, and that sort of breaks away from the patterning." (Obarzanek)

- **Synthesize**

By synthesizing different materials and ideas together the choreographer was able to create three pieces that totally differed in nature. Mixing the circular phrase with the juggernaut and the fixed gaze idea created interesting social relations in piece 1. As the choreographer explains: "I did not think the circle phrase had any sense to be in this. It is not connected to the first part. But then, the staring at her was a connection I quite liked. The looking was privileged over the circles and her walking through." (Obarzanek)

In addition, combining the circular phrase with the idea of evolution and a journey formed a very interesting solo in piece 2, and merging the same phrase with the idea of symmetry and contact created both intimate and personal relations between two dancers in piece 3.

The idea of integrating the audience into pieces 2 & 3 added a new dimension to it. This was mainly because the viewers were turned into performers unexpectedly. In the second piece it seemed as though the audience played the role of commentators, as they were performing human gestures in response to what the dancer was doing. However, in the third piece, they enhanced the dancers' circular movements as they were replicating them. This resulted in a sequence that had a bit more fluidity and rounded shapes.

- **Switch Level of Focus**

As the choreographer's intention was to create three different works, he had to continuously shift his focus from previous works to the current work, and from the overall structure to the content itself. This

was evident in the types of strategies he used (local and transitional), and is further emphasized in the following statement:

> "The content is very important and so is the structure. The content holds the relationship to sensuality, to work, rigor. It's a textural thing. The structure is the moving forward. It's the way it shifts and shows you different elements of that. They are both different, but I can't place one over the other." (Obarzanek)

Below is an example of how he moves from describing the overall structure of piece 1 to elements within it as he is trying to make sense of it:

> "There are three main things going on. There is the first part, the personal dance, which is very minimal and very big. Then there is the circle phrase, and then there is the enveloping phrase that is based on the circular phrase, but actually when you take the circle phrase out it looks like something completely different. The dynamic is very playful, particularly Fiona's phrase. We finish with that, so it's a little bit ridiculous and very performative. In fact, where we begin it is not very performative, it is more personal or private." (Obarzanek)

Another aspect the choreographer was very aware of throughout the process was the audience's point of view. Thinking of ways to engage them in the work shaped his decision-making, as he often tried to make the piece more readable and interesting for the observers:

> "We're making work for audiences…so it is really about the relationship to the audience. Even if it is about ignoring the audience, it is still about the audience and how is the audience affected by this. If there is no consideration of the audience, than it is kind of out of control in a sense. It is irresponsible; it does not consider what it is there for. I'm not necessarily dancing to the audience. It is not what I imply, but it is there because the audience is there. This has always been the outcome." (Obarzanek)

- **Form Assignment**

Originally, the choreographer created three types of movement themes involving shaking, circular, and juggernaut phrases. However, as the choreographer's intention was to create three distinct pieces, these original sequences were assigned into different forms. And so, the choreographer was trying to find "a way to see it (the material) in the most interesting way." (Obarzanek) Consequently, these phrases were reworked into new configurations, creating new relationships, qualities, and meanings. Generally, action units were developed separately, but since the choreographer tended to work sequentially (developing a section and then adding another one), in many incidents, the development of each section was dependent upon the section that preceded it. For instance, in piece 1, the minimalistic execution of the circular phrase in the second part led to building the 'enveloping' section, encompassing the juxtaposition of the minimal circular phrase with the exaggerated version of it. Working this way, the choreographer not only established consistency, but he was also able to explore new ways to progress within a certain context.

- **Propagate**

The task the choreographer was given required the reuse of the same movement materials over and over again. However, aside from that, the choreographer also chose to propagate some elements from earlier versions and reintroduce them in new forms in his second and third pieces.

For example, in the first piece the choreographer established a system wherein the audience observed dancers who intensely observed another dancer, turning the dancers from performers into viewers. This idea was propagated into pieces 2 & 3 in a different format. In these pieces, the audience observed a dancer who took cues from the performers on stage in order to guide the audience's gestures.

Other ideas that were propagated between pieces were: juxtaposing the odd dancer's movement with that of the rest of the group, using the traveling phrase to bring the dancers onto the stage, and using the juggernaut to shift the choreography into a new state.

- **Evaluate**

Throughout the process, the choreographer seemed to mostly evaluate the context he assigned for each piece. Staying with it meant he kept modifying each piece so that the ideas he placed value on could be read more clearly. In piece 1, it was contrasting movement in size and shape. However, he also put the dancers' relations in the forefront. In piece 2, the evolution of the solo was his main concern, and in piece 3 it was symmetry and patterning. This is how the choreographer describes piece 2:

> "The main thing to me was the idea of the solo and the audience involvement…we introduce the dancer or bring her on stage and then the rest of the ensemble goes off stage. To be honest it is really just a tool to get her on and take her off stage. If this was a complete work, it will just be a solo. That's where the strength is and that's where the focus is. I felt that these guys were working really hard and were left out from the second piece… that's why for this exercise I'm happy to leave these people in because there is some diplomacy to it." (Obarzanek)

- **Brain-write**

By using brainstorming sessions, the participants could identify new constraints and variables for reshaping the same material into new forms and structures.

Obarzanek explains that his process is often very collaborative, and that he will deliberately look for people who have very strong input into his work. "We all function as a choreographic team that is led by me or given direction by me, but some of the best works were a result of people who have strong opinions or decision making." (Obarzanek)

During this particular process, the dancers contributed to the construction of the pieces in different ways. They shared their associations and thoughts about the concept- 'polarities'. They created almost all of the movement that was used in the piece, and manipulated it based on the instructions they were given from the choreographer. When something was not working (e.g., timing issues, transitions) the dancers' problem-solving skills were required, and their solutions were often implemented. For example, in piece 2, linking some traveling phrases together was "easily solved by a group effort, modifying the end of each phrase." (Dancer 2.2) Furthermore, before commencing the third piece, the choreographer turned to

the dancers for suggestions. As Dancer 2.2 describes: “Coming up with ideas for the third piece was a group effort. Trying to find ways in which we could use existing material to create something we haven’t done.” Consequently, ideas such as contact, symmetry, and canons emerged and became the core of the third piece.

8.4 Rehearsing Time, Strategy use, and Quality of Outcomes

One aim of the study was to investigate the relationship between rehearsing time, quantity of strategies, and quality of final outcome. Comparing the length of time the choreographer spent on creating each piece with the data presented in table 8.2, it appears that the more time the choreographer spent on structuring a single piece, the more changes he applied. Piece 1 took the longest to complete, as it spanned over the course of three days, and therefore involved the highest amount of strategies overall (68). In comparison, less time was invested in structuring pieces 2 & 3 (both spanned over the course of two days), and therefore fewer strategies were applied during these processes (35 and 31 strategies respectively).

Still, in order to clarify whether the application of more strategies supported a better outcome, in the last day of the study the choreographer was asked to reveal which of the three pieces he was most satisfied with. His answer indicated that piece 2 was his most favoured option, as he found it to be original, creative, and exciting. Thus, from his answer, it seemed as though having more rehearsing time and using more strategies didn’t necessarily result in a better outcome. Still, it could be that having a longer experimentation time in the first process, he approached his second piece with more clarity, and therefore he completed the second piece more quickly and without applying too many changes. And so, if this is the case, time and quantity of strategies do play an important role in producing works of quality.

8.5 Explicit Strategies and the Structuring Process

One aim of this present study was to find out whether the use of explicit strategies, and in particular design strategies, has the potential to support choreographers’ structuring processes. Therefore, Choreographer 2 was asked to apply the same strategy that was given to Choreographer 1 (‘nesting’) while structuring his second piece. However, the choreographer was so caught up in his own creative

process that he completely forgot about the strategy. Still, even without consciously thinking of the strategy, some of his choreographic arrangements had characteristics of ‘nesting'. For instance, in one section the dancers were positioned in a way that hid the soloist between them, and in another, the soloist seemed to be ‘nested’ in between the two opposing lines of the audience. Furthermore, the dancers who led the audience’s movements were concealed behind the viewers’ seats until it was their time to perform. Unfortunately, even though all these examples show a ‘nesting’ effect, because they were not applied consciously by the choreographer, or they were not applied as a response to the task, it was not possible to draw clear conclusions as to the effect explicit strategies had on his structuring process.

9. Results: Comparing the Structuring Process of Two Expert Choreographers

9.1 Introduction

In chapters 7 & 8, the structuring processes of two expert choreographers were analyzed separately, showing their particular choreographic tendencies. However, in this chapter, qualitative and quantitative data pooled from the formal study will be compared. The purpose is to uncover the similarities and differences in the choreographers' approaches to structuring. Notably, in order to avoid unnecessary repetition, this chapter will only review questions 1-4. The remaining research questions will be discussed in relation to literature in dance, cognition, and creativity in the next chapter.

9.2 Structuring and Expertise

In general, both choreographers followed a similar pattern when it came to their structuring processes. They created an initial structure by combining different movement materials together. They evaluated the outcome, and then based on their assessment they gradually transformed the composition. Refining the composition was an ongoing process that was enabled through the use of multiple strategies. These supported the choreographers in resolving a variety of problems that obstructed them from achieving their goals.

		Choreographer 1	Choreographer 2
Local	n	129	121
	%	83%	90%
Transitional	n	26	13
	%	17%	10%
Total	n	155	134
	%	100%	100%

Table 9.2 Comparing the use of multiple strategies by two choreographers during the structuring of three dance pieces.

Table 9.2 compares the use of multiple strategies, both local and transitional, by two expert choreographers during the structuring of their three dance pieces. Both choreographers applied a similar amount of strategies overall (155 & 134), with a strong inclination towards initiating local changes (local changes were used 83% & 90% of the time). Still, Choreographer 1 tended to perform major structural changes more frequently than Choreographer 2 (17% of the time as oppose to 10%). This could be due to two reasons: the problems she encountered and her particular working method. It could be that the problems that emerged in her creative process required larger structural adjustments, and it could also be that because she worked less sequentially than Choreographer 2, her structuring process required more experimentation. Choreographer 1 tended to work on action units separately, and only later did she consider which could work together and how. By comparison, Choreographer 2 mostly progressed linearly, establishing a section and then considering what could come next.

In any case, the figures in the table show that choreographers arrive at a satisfactory outcome by using multiple strategies. These gradually transform the composition, allowing the choreographers to consider a variety of dance designs and solutions prior to settling on just one. Still, choreographers seem to rely particularly on local strategies. This means that they change their compositions more on the micro level rather than the macro. By doing so they can refine and develop their work quickly and effectively without interrupting the creative flow. That said, using local strategies more often could also be the result of time pressure or other contextual constraints (e.g., working with an unfamiliar group of people).

9.3 The Application of Strategies for Structuring and Varying Dance Compositions

In the previous section, the structuring processes of Choreographers 1 & 2 was explained in general, tying their practices together with the use of multiple strategies, and in particular local strategies. In this section though, the type of local and transitional strategies the choreographers applied will be compared while highlighting their frequency of use. Following that, the contribution of process strategies to the

choreographers' structuring processes will be clarified, demonstrating how they support innovation and creativity.

9.3.1 Local Strategies

		Choreographer 1	Choreographer 2
Manipulate	n	85	96
	%	66%	79%
Replace	n	23	14
	%	18%	12%
Layer	n	21	11
	%	16%	9%
Total	n	129	121
	%	100%	100%

Table 9.3.1 Comparing the use of local strategies by two choreographers during the structuring of three dance pieces

Table 9.3.1 shows that overall both choreographers applied a very similar amount of local strategies (129 & 121), with manipulation of elements being their most favoured option (~66%, ~79%), replacing second (~18%, ~12%) and layering third (~16%, ~9%). In both cases, local adjustments were used as tools for refining and developing the compositions. For instance, layering increased the level of sophistication and complexity of parts, as it created tension between different events happening at once (e.g., a group of dancers remains in stillness while a dynamic solo is being performed). Layering also allowed for communicating ideas more clearly. Choreographer 1 juxtaposed sections to create further contrast and opposition, which emphasized the idea of polarities even more, and by introducing an additional movement principle, Choreographer 2 could form clearer relations between the dancers (e.g., while dancing, keep observing the odd dancer).

9.3.1.1 Local manipulations

In order to better understand why both choreographers mostly relied on local manipulations when structuring their pieces, in this section their use of spatial, qualitative, and temporal manipulations is compared and analyzed.

		Choreographer 1	Choreographer 2
Temporal	n	19	48
	%	22.5%	50%
Spatial	n	52	31
	%	61%	32%
Dynamical	n	14	17
	%	16.5%	18%
Total	n	85	96
	%	100%	100%

Table 9.3.1.1 Comparing the use of local manipulations by two choreographers during the structuring of three dance pieces

Table 9.3.1.1 shows that although manipulation of elements was the choreographers' most favorite technique for altering their dance compositions, their use of spatial, temporal, and dynamical manipulations was quite different. Choreographer 1 mainly modified spatial elements (~61%), and Choreographer 2 mostly applied temporal adjustments (~50% of the time). These differences were probably related with their artistic intentions. Choreographer 1 was interested in finding multiple forms of spatial oppositions, and Choreographer 2 explored extreme temporalities (moving very fast versus very slow). Their different points of departure led to enforcing particular changes that would enhance the aspect they were working on. That said, it could also be that the particular problems the choreographers identified in their own processes required particular solutions that involved more spatial or temporal adjustments, making their decisions more contextual. Otherwise, it could be that this is simply their personal tendency, meaning that they usually pay more attention to one element than the other, making their decision-making more automatic and habitual.

In terms of dynamical changes, the two choreographers have only rarely used this form of local manipulation (~17% or ~18% of the time). The explanation could be that spatial and temporal modifications have already changed the quality of movements quite a bit, and that's why they were used less often. For instance, asking the dancers to move slower had an effect on the way they performed their movements (i.e. more calmly or attentively), and that is why the choreographer chose not to alter their performance quality.

9.3.2 Transitional strategies

During the structuring process, some compositional problems could not be resolved locally, and therefore required changing the overall structure by applying transitional strategies.

		Choreographer 1	Choreographer 2
Overlap/Separate	n	4	1
	%	15%	8%
Add/Remove	n	7	7
	%	27%	54%
Shorten/Extend	n	8	2- extend
	%	31%	15%
Repeat	n	1	1
	%	4%	8%
Replace	n	6	2
	%	23%	15%
Total	n	26	13
	%	100%	100%

Table 9.3.2 Comparing the use of transitional strategies by two choreographers during the structuring of three dance pieces

Table 9.3.2 compares the use of transitional strategies by the two choreographers during the structuring of three dance pieces each. While both choreographers used the same techniques (Overlap/Separate, Add/Remove, Shorten/Extend, Repeat, and Replace), there were obvious variances in their frequency of use. Choreographer 1 tended to shorten or extend sections more frequently (about third of the time),

while Choreographer 2 tended to add or remove sections more often (more than half of the time). Their choice was dependent upon the type of compositional problems that arose along the way. Extending sections meant ideas could be developed further, as opposed to jumping abruptly from one thing to the next, and adding sections allowed for finding new ways to progress.

Another apparent difference between the two choreographers was the quantity of transitional strategies they applied. The figures in the table show that Choreographer 1 applied twice as many transitional strategies compared to Choreographer 2 (26 versus 13). As mentioned before, this difference may relate to their particular practices (one works more sequentially while the other more sporadically) or to the type of problems they encountered along their creative process (one encountered more problems that could only be resolved by changing the macro structure).

9.3.3 Process Strategies

So far it has been demonstrated how local and transitional strategies supported expert choreographers in structuring and refining their three dance pieces. However, as shown in the previous chapters, generating three distinct dance compositions was mainly possible due to the application of process strategies. Notably, while both choreographers relied on the same nine process strategies, their particular intentions and goals led them onto different paths and resulted in dissimilar outcomes.

For instance, because Choreographer 1 valued the theme 'polarities' so much, she continuously thought of ways to enhance contrast within and between sections. On the other hand, Choreographer 2 preferred to stay true to the context he gave each piece (i.e. extremities and group relations, psychological journey, symmetry and contact), and constantly looked for the best ways to articulate it. He assumed that contrast is inherent in any choreography and therefore did not try to consciously represent it, while Choreographer 1 deliberately searched for ways to make it more apparent. Still, in order to create a real difference between her three pieces, she had to rely on the 'analyze morphology' strategy. This type of process strategy enabled her to come up with multiple ways for achieving contrast, which resulted in new forms.

Throughout the creative process, the choreographers kept reworking the original movement materials into new forms by using a variety of choreographic devices (layering, patterning, and juxtaposing

materials). However, when it came to sequencing sections, Choreographer 2 worked more sequentially, establishing one section and then adding the next, while Choreographer 1 worked more sporadically. She kept jumping between action units, developing them further before connecting them together. Her process involved more experimentation, as she was repeatedly testing the order of units and their connections. Interestingly, both choreographers chose to create a completely new piece each time, as opposed to varying their previous pieces. They managed to do so by prioritizing a new set of constraints for every process. These restricted their choices and gave each piece a particular focus and tone.

Another tool the choreographers used for creating novel dance compositions was merging different concepts together. In fact, sometimes ideas were propagated from previous pieces and were combined with new ideas so that variety could be achieved. Choreographer 1 kept propagating the concept of contrasting the odd dancer to the group, and Choreographer 2 propagated the element of audience participation. Still, both reworked these ideas into new configurations each time.

Finally, by shifting the focus between the content and the overall structure, and between the current process and previous processes, the choreographers could not only develop and refine each piece further, but also ensure that a real difference between them was accomplished.

9.4 Rehearsing Time, Strategy Use, and Quality of Outcomes

In this section, the relationship between rehearsing time, quantity of strategy use, and quality of outcomes will be examined with respect to the two choreographers.

Overall, the data illustrated that the more time the choreographers spent on a piece, the more changes they applied to it. However, while Choreographer 1 appreciated the piece she spent most of the time on (piece 1), Choreographer 2 preferred the piece that he invested less time on and which involved fewer changes (piece 2). And so, in the first case it seems as though there is a clear connection between the amount of time that is spent on a piece, the number of alterations it undergoes, and the quality of the creative outcome. In the second case, the connection appears less obvious.

10. General Discussion

10.1 Introduction

The aim of this study is to uncover how expert choreographers structure and vary their dance pieces. To accomplish this, the structuring methods of two expert choreographers were examined in an experimental setting whereby structuring could be isolated and investigated separately from other stages. Chapter 5 discussed the study methodology, and Chapter 6 detailed the treatment and coding of data. In Chapters 7 & 8 the participants' particular approaches to structuring were analyzed separately, and in Chapter 9 their structuring processes were compared.

In this chapter, the study's findings will be discussed in relation to current literature and research in design, cognition, and choreography. Any consistencies or inconsistencies concerning experts' use of strategies will be drawn out while highlighting the special skills and abilities expert choreographers possess. Furthermore, the reasons behind the choreographers' structuring decisions will be explained, and the effect of using explicit strategies (independent variable, level 2) on the structuring process will be described and placed in a wider context.

First, the structuring tendencies of expert choreographers will be emphasized, including their reliance on multiple strategies, in particular, local, transitional, and process strategies. Next, the intricate relationship between rehearsing time, quantity of strategy use, and quality of outcomes will be explored, followed by an analysis of the effect explicit strategies have on the creative process and final outcomes. Reviewing question six will show how choreographers' practices differ as a result of personal preferences and intentions, and how they are influenced by the prevailing conditions. Other effects on the structuring process will be brought forward, such as the choreographers' experience and their collaboration with the dancers. To conclude this chapter, a final summary of the research findings, limitations, and possible applications will be offered, as well as recommendations for future research.

10.2 How do expert choreographers structure their dance compositions?

Generally, choreographers begin their structuring process with the creation of an initial structure, a sequence of action units/sections. They evaluate the outcome and then modify and develop the composition through the use of multiple strategies. Choreographers have a dynamic relationship with their work, and just like designers, they go through cycles of 'seeing-moving-seeing'. They interpret shapes and relationships and transform these in different ways (Schon and Wiggins 1992). By thinking critically of the outcomes, choreographers are able to identify problems which need attention, from issues relating to the piece's continuity, variety, and consistency to issues concerning functionality, readability, performativity, and originality. Structuring strategies offer a range of solutions to the many facets and complexities involved in dance-making, and by applying them, the choreography is gradually altered and elaborated. This kind of process could be compared to theories of biological evolution, as the choreography gradually evolves and transforms while forms that are not adaptive to the purposes for which they have been created are not likely to survive (McKechnie 2005).

As structuring is an ill-defined problem, choreographers adopt a solution-focused approach. This means that, like experts in other areas, they too prefer to focus on generating many solutions (Jonassen 2000; Kruger and Cross, 2006 Cross 2004), as opposed to focusing on problem analysis (a solution-focused strategy) (Jonassen 2000). This tendency was well captured in the present study, as the two choreographers developed their pieces gradually through many alterations and modifications, creating many potential designs. Notably, choreographers, just as other solvers of ill-defined problems, approach their structuring process in a very personalized way (Jonassen 2000). They select particular constraints and contexts which helps in limiting their search for solutions by guiding them in a certain direction.

All in all, the choreographers' application of multiple strategies demonstrates their ability to envision other possibilities. It also reflects their willingness to remain flexible and not to conform to one design too early. It seems as though their non-compromising approach to dance-making and striving for perfection motivate them to constantly refine and develop their work in the search for better alternatives.

10.3 What sort of strategies do expert choreographers apply for structuring and varying their dance compositions and what is their frequency of use?

Expert choreographers apply three types of strategies during the structuring phase. These strategies support choreographers in developing and refining their pieces, getting them closer towards achieving their artistic goals. Local strategies enable change at the detail level. Transitional strategies transform the overall structure, and process strategies direct the choreographers' overall approach throughout the solution space by forcing changes in a particular direction. These are the same groups of strategies found to be used by expert industrial designers as they consider different design concepts (Yilmaz et al. 2011). Still, each group of practitioners (choreographers and designers) employs their own domain-specific strategies. By applying local strategies, choreographers may replace, manipulate, and layer movement elements, and by applying transitional strategies they may reorder, remove, add, merge, separate, shorten, extend, or replace larger movement sections. Together these strategies aid choreographers in making micro and macro changes to the composition, which gradually transforms the content and structure of the work. Designers and choreographers alike tend to jump from thinking about the overall structure to thinking about finer detail and back again. This switch of focus allows practitioners to think about both the depth and breadth of created concepts. It enables them to overcome fixation and to elaborate further details within the work (Yilmaz et al. 2011).

Interestingly, the two choreographers used local strategies more than transitional strategies, and performed local manipulations more regularly than replacing and layering elements. By manipulating spatial, temporal, and dynamical elements, the choreography could be refined and tightened up quickly and almost effortlessly without disrupting the creative flow. Local changes were implemented 'on the go', even while performing the piece (e.g., go faster/slower, sharper/softer). The dancers were able to embody them quickly, and the choreographer could rapidly evaluate whether these adaptations worked or not. Yet, when the choreographers encountered a problem that could not be resolved locally (i.e. the piece was too long), they shifted their attention to the overall structure. Indeed, experts were found to direct their attention to what matters or to what they perceive as the most dominant element (Schiphorst 2011 & Lucas 2011), and then transform or rearrange it to reach a goal efficiently (Sobel 2001).

Transitional changes involved more mental effort and processing, as they required a broader perspective and higher level of problem-solving skills. For instance, considering which section should be replaced with which and implementing this replacement is often much more complex than changing a movement's speed, quality, or level. Similarly, local strategies such as replacing and layering elements required more effort, time, and experimentation than local manipulations. Thus, they were used less often. In fact, the replacing and layering strategies were used only when obstacles were found. For example, when a transition failed, the choreographer looked for movement replacement and tested a few options so that a sense of flow could be restored. When more sophistication, complexity, contrast, or meaning were required, the strategy of layering elements was employed. Then, the choreographers had to negotiate the juxtaposition of various elements before making their final choice.

While the reason for using one group of strategies more than the other could be a consequence of time restrictions (meaning that there is a possibility that with more rehearsal time the choreographers would have been able to experiment more with the overall structure), from an observer's point of view, it seemed as though once choreographers find a structure that works, they stick to it and keep refining it mainly through local alterations. Cross (2004) also recognized a similar pattern with designers. He argues that highly skilled designers produce good early concepts that do not require radical alterations. Expert designers can modify their model fluently and easily as difficulties surface, without recourse to exploration of alternative concepts. Either way, Cross explains, "designers are reluctant to abandon early concepts, and to generate ranges of alternatives" (p.8). The last quote may as well be used to describe how the choreographers approached the creation of each piece, as they continued to develop their one design, as opposed to searching for replacements. Still, in this study they were deliberately asked to generate three different dance pieces. While this seems to be counterintuitive to their usual process, they managed to do so by applying process strategies. These types of strategies enabled a real 'creative leap' (Cross, 2004), or innovation in design, leading the choreographers on a completely new path by setting a broader plan and viewpoint from which the appropriate course of action was determined (Yilmaz et al. 2011). Taking a 'broad system approach' (Cross 2003; Yilmaz, 2011, p.408) assisted the choreographers in tackling the design problem and allowed them to overcome the contextual constraints

(using the same theme, music, work length, and movement material). By using process strategies, the choreographers were able to discover new and unexpected variables and contexts. For instance, Choreographer 1 usually framed her work under two principles which constrained her search space but still provided her with many possibilities. Piece 2 was based on the idea of contrast and 'weaving through', and her third piece revolved around contrast and rotating around an axis. Choreographer 2, on the other hand, was interested in exploring movement extremities and group relations in his first piece. In his second piece, a personal transformation, and audience participation, and in his third piece, audience participation, symmetry, and contact. These constraints not only gave the pieces coherency, but also stimulated divergent thinking (Guilford 1956), as different forms of organization and representation were explored. Choreographer 1 experimented with multiple ways to generate contrast and opposition, and Choreographer 2 restructured the very few movement phrases he had over and over again into new forms. And so, by prioritizing certain constraints, the choreographers could limit their search space while looking for inventive and novel solutions (Gelb, 1987).

Yilmaz et al. (2011) state that the "general nature" of process strategies and their "optional or conscious invocation", especially "when the flow of ideas had reached a stopping point" suggest these are "important tools to learn" (p.410). Indeed, in incidents where the choreographers ran out of ideas, they relied on process strategies to pull through. The most obvious one was the brain-writing strategy, whereby the whole group used brainstorming sessions in an attempt to find new constraints and variables as reference points. Choreographer 2 only started his last process after discussing different possibilities with the dancers. Together, they tried to work out how else the material could be utilized to form yet another new piece. And so, ideas such as symmetry and physical contact were suggested. These were synthesized with audience participation (an element that was propagated from the 2nd version) and formed the general framework of piece 3. Examples like these show that by identifying new constraints and variables, choreographers can expand their search for new designs (Yilmaz et al. 2011).

Cross (2003) explains that expert designers address issues at several levels of generality, developing a particular perspective from which they identify relevant first principles of design to embody the concept. The study's findings show that expert choreographers operate in a similar way through the use of process

strategies. They find generic frameworks, constraints, and contexts, and then use common choreographic devices to represent these in their composition. Choreographer 1 decided to build her work around the idea of polar opposites and evaluated that constraint more than any other. First, she thought of ways to represent the theme 'polarities' through contrast and opposition. However, later she seemed to put more emphasis on spatial elements, and found numerous forms of spatial organization that are oppositional. She experimented with contrasting traveling patterns, varying directions and levels, juxtaposing different phrases, shifting the dancers' formation, and alternating between small and expansive, angular and curved, defined and improvised movements.

Another helpful process strategy applied by the choreographers for varying their dance compositions involved having a different starting point each time. This strategy was not mentioned in Yilmaz et al.'s (2011) list of process strategies. However, it seemed to stimulate creativity and variety and appeared to prevent blockage and fixation. Choreographer 1 began constructing piece 1 by shifting the dancers' formations repeatedly. Then she worked her way backwards and forwards, filling in the missing gaps. Her second piece began with a unison, and the third with the dancers following the movement of foam rollers as they are pushed on the ground. Choreographer 2 began piece 1 with a group juggernaut, piece 2 with a solo, and piece 3 with a duet. Having these different departure points heavily influenced the development of each work, including their form and character.

10.4 Is there any relation between the strategies choreographers apply during their structuring process and the quality of the final outcome?

At the end of the formal study, each choreographer was asked to disclose which of the three pieces was their favourite. The aim was to uncover whether there is a correlation between quantity of strategy use and quality of outcomes. Interestingly, Choreographer 1 preferred the piece that involved the highest number of strategies. However, Choreographer 2 preferred a version that encompassed fewer strategies and described it as more original, interesting, and exciting.

Past studies have examined the relationship between divergent thinking and creativity (Guilford 1950, Runco et al. 2000, Sternberg and Grigorenko 2000, and Stokes 2000) and between the quantity of

solutions and the quality of outcomes (Parnes 1992, Yilmaz 2011). Yet, while Yilmaz (2011) argues that a larger set of strategies generates outcomes that are "distinguishable from the rest, representing novel concepts" (p.404), our results were more ambiguous, as they indicate it is not necessarily the quantity of strategies that leads to a better outcome. In fact, it seems as though finding the 'right' framework for the piece is what generates more satisfying results. Choreographer 1 had a clear intention to begin with, and although she worked within a broad framework (creating contrast and opposition in space, time, and dynamics), it guided her structuring process from the start. All the modifications she enacted during her first process allowed her to experiment and test different ideas and refine the quality of movements under a very clear criterion. Choreographer 2, on the other hand, found a stronger framework (psychological transformation and audience participation) in his second process, and his commitment to it from the beginning led to a piece that had clear logic and development. Therefore, he employed fewer modifications, as the constraints he chose were very specific, and thus the composition took a profound shape very quickly. The notion of problem framing in relation to expertise is discussed in Cross's article (2004) '*Expertise in Design*'. Expert designers select features of the problem space to which they choose to attend (naming) and identify areas of the solution space in which they choose to explore (framing). Formulating a design problem is done through setting boundaries, focusing on particular things and relations, and identifying coherence that will guide subsequent moves. Seeing the design situation in a certain way (the designer's 'problem paradigm') and defining its 'guiding themes', principles, or 'generators' both highly influence the designing process. Cross (2004) argues that "processes of structuring and formulating the problem are frequently identified as key features of design expertise. Outstanding designers are found in various studies to be proactive in problem framing, actively imposing their view of the problem and directing the search for solution conjectures" (p.11). Indeed, our findings show that the more personal and clear the problem framing of the choreographers was, the more they were satisfied with the composition they had created.

10.5 Does rehearsing time have any effect on the structuring process?

One aim of this study was to explore the connection between the amount of time spent on a piece, the quantity of strategy use, and the quality of outcomes. Interestingly, the data indicated that time had a major effect on the use of strategies, as the more time spent on a piece, the more changes appeared. Still, as mentioned in the previous section, using more strategies does not necessarily lead to a better outcome. And so, while some studies (Yilmaz et al. 2011) show a strong correlation between quantity of strategy use and novelty of design, our results were more ambiguous. Choreographer 2 preferred piece 2, which he has spent less time on and which involved fewer strategies. This was because he perceived it to be more original, interesting, and coherent than the other two pieces. Still, it could be argued that because he already tested some options in his first piece, he had a better idea of what he wanted to do in his second process, and thus, he did not have to employ that many strategies when structuring it. In contrast, Choreographer 1 was mostly pleased with piece 1, the piece she spent most of the time on and to which she applied most changes. In her case, having more experimentation time and using more strategies led to a better outcome:

> "I like number 1 because I felt I gave it more time and it had more solid solution finding." (Healey)

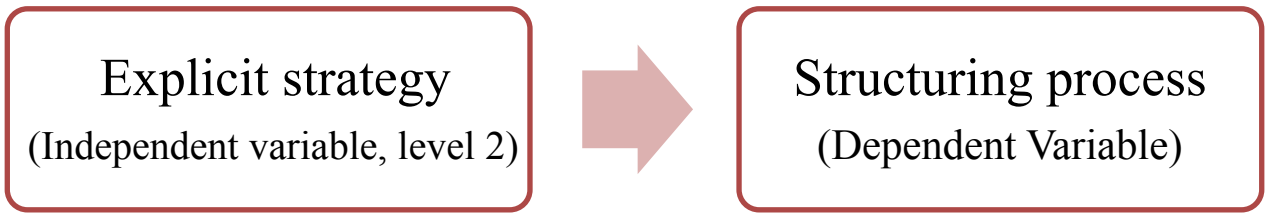
Even though both choreographers differed in their preferences, they both acknowledged in their interviews the importance of having enough experimentation time and even time away from the creative process. They discussed the importance of accumulating, developing, and refining a large number of ideas prior to structuring and editing the piece. Their preference fits with how other dance experts feel about their creative process. Renowned choreographer McGregor argues: "I do not edit early on… you just swim and forage in this sea of 'stuff,' with inputs from all sorts of people and places. At some point over a period of time a shape starts to emerge and you realize that this bit is useful for that bit" (from Egon Zehnder 2017). Dance theorists agree that less time pressure and spread-out rehearsal time allows

for more gestation and incubation (Butterworth & Wildschut 2012). These periods of unconscious work are helpful in testing and understanding aspects of the work while allowing new ideas to spring forth, especially in points of blockage and fixation. It allows for a change in perspective and renewed creativity (Minton 2007), and thus, it has a special role in finding novel solutions (Gilhooly 2016). Different studies have identified a positive incubation effect on problem solving and creativity (Sio 2009 from Sawyer 2006). For instance, Tsenn et al.'s (2014) findings show that incubation generates a greater quantity of ideas, while extended time aids in high quality and novelty. The generation of many ideas seems to be one of the primary components of the creative process (Runco & Chand 1995), as many theorists believe that quantity of ideas breeds quality. As Osborn (1963) argues, the greater number of ideas generated, the greater the chance of producing a radical and effective solution. Therefore, there is no wonder choreographers try to protect their right for longer rehearsal and experimentation time. The effect of rehearsing time on the quality of outcomes and creativity is further discussed in Steven et al.'s (2003) study on choreographic cognition. According to them "the creation and development of significant works takes time" (p.323). They argue that often choreographers (especially in Australia) are not given enough time "to explore, test, and revise creations" (p.323), and therefore one aim of their project was to provide lengthier periods of creative time without the pressures of "commercial schedules". They also state in their article that a richer outcome was enabled "only because there was time for the shared work to put down, tap roots, unfold, and grow" (Grove & McKechnie, 2005, p.5).

While it appears that there is general agreement that creativity, novelty, and effective problem solving require time, it is essential to ask what would be the right amount of time for achieving choreographic goals. The effect of time pressure on creativity and the quality of outcomes was researched by several psychologists. Specifically, commentators suggest that the experience of high time pressure stifles creativity by reducing engagement in exploratory thinking and thus relying on familiar solutions when approaching problems (Andrews & Smith 1996). Yet, more recent research by Baer and Oldham (2006) suggests that intermediate time pressure could actually support creativity if the environment and personality traits are optimal. Therefore, future studies may look into the effect of time pressure on

creativity, taking into consideration the working environment and personality profile of the choreographer.

10.6 Can the use of explicit strategies support the structuring process of expert choreographers?



One goal of this study was to investigate the effect of explicit strategies (independent variable, level 2) on the structuring process, while examining whether choreographic practices could be expanded by integrating strategies that are used by designers. Consequently, the study's participants were asked to apply a design strategy called 'nesting' (collapse/hide/flatten elements within each other), and to use it when structuring their second piece. Afterwards, the choreographers were interviewed about their experience, and they were asked about the impact this strategy had on their processes. While it was expected that the 'nesting strategy' would have a positive effect on the structuring process, the results were quite indefinite. Choreographer 1 was consciously trying to incorporate the 'nesting' strategy into her second piece, but did not believe it generated any unique results. Still, some forms of 'nesting' were propagated into her third piece, and indeed, created new forms which the choreographer was very satisfied with. By comparison, Choreographer 2 was so invested in his own process and considerations that he completely forgot about the 'nesting' strategy. Therefore, even though I could recognize a few 'nesting' incidents in his second piece, they were not deliberate. Due to this, it was impossible to make absolute conclusions about the effect explicit strategies have on experts' structuring processes.

Notably, most studies concerning the effect of explicit strategies on problem solving focus on novices. These studies show that the application of explicit strategies improves novice's level of achievement and increases their positive perception of their problem solving abilities (Rudd, 2010; Selçuk et al. 2008; Newman 2007). Other studies found that novices produced concepts that were judged more creative when they made use of explicit strategies (Yilmaz et al. 2010c). Despite extensive research, I could not find any studies that examined how experts' practices were affected by the use of explicit strategies. In

fact, most studies concerning expertise either focused on comparing experts to novices or on analyzing experts' performance whilst retrieving the strategies they apply (Ericsson and Staszewski 1989; deGroot 1965; Yilmaz 2001; Ahmed et al. 2003; Chi et al. 1981; Cross N. 2003, 2004; Ericsson 1996; Ericsson et al. 2006; Kavakli & Gero 2002; Lawson & Dorst 2009). Experts' experience, knowledge and skills make them exceptional problem solvers. They have plenty of tools and strategies to draw upon, and therefore, asking them to incorporate a random strategy into their practice does not seem to enhance their performance. In fact, it only seems to distract them from reaching their goals. Still, the use of explicit strategies could be useful for training novice choreographers. Early exposure to structuring techniques can support less experienced practitioners by expanding their choreographic 'tool kit'. Consequently, they may gain better structuring skills more quickly while maximizing the variety and novelty of their work. Thus, future studies may look into the effect explicit strategies and strategies informed by other fields such as design have on novice choreographers and their structuring process.

10.7 How do expert choreographers differ in their approach to structuring?

In chapter 9, the use of strategies by two expert choreographers during the construction of three dance pieces was compared. This enabled the identification of similarities and differences in their approach to structuring. Overall, the results show that both participants mainly applied local strategies, particularly local manipulations. However, Choreographer 1 mostly focused on spatial manipulations and Choreographer 2 on temporal. In terms of transitional strategies, Choreographer 1 favoured extending or shortening sections and Choreographer 2 adding or removing parts. By using observations and interviews, it was possible to uncover the reasons behind these variances.

Overall, differences in strategy use seemed to be the consequence of personal preferences as well as problem identification. In other words, the choreographers' goals and their awareness of the prevailing conditions affected their particular choice of strategies (Pakes from Butterworth & Wildschut, 2009, P. 12). In interviews with Choreographer 1, she declared her intention to create spatial contrast and opposition, and thus, her attention to this aspect led to its reinforcement over and over again (she also admitted that space is always very important to her). With Choreographer 2, the process began with

exploring extreme temporalities, shifting between them and juxtaposing them. Thus, it seems as though this intention lasted throughout the process and led to focusing on this aspect more than any other.

Interestingly, while local manipulations seemed to be a matter of personal preference, differences in the application of transitional strategies appeared to be more of a practical response to the problems that emerged. For instance, because Choreographer 1 identified more sections that needed further development, she applied the extending strategy more often, and because Choreographer 2 had to expand his compositions so they fit into the ten minute timeframe, he kept adding sections more often.

Yilmaz et al. (2011) explain that the types of strategies designers apply depend on the nature of the design problem, the elements it involves, and the designer's personal preferences. The same variables can explain the difference between the two choreographers in terms of the strategies they applied. Although the two participants were given same task and restrictions, they still framed the problem differently and gave each of their pieces a different context. They worked with different dancers and movement materials, and having their own aesthetic preferences and interests influenced their creative processes, outcomes, and choices of strategies. Furthermore, each process involved its own particular problems which required a specific combination of solutions or strategies.

To conclude, while expert choreographers tend to apply some strategies more than others (more local strategies than transitional and more local manipulations than replacement or layering), each choreographer leans towards using particular strategies more often and a different set of strategies per process based on the problems they identify. Yilmaz (2011) proposes that "patterns of heuristic (strategy) use observed across designs may reflect the designer's unique style" (p.412). However, determining choreographers' structuring style requires analyzing their use of strategies over a longer period of time and in other settings. By doing so, one can better assess which tendencies are permanent and which are not.

10.8 Distributed Creativity

Until now, structuring was discussed in relation to the two choreographers. Indeed, they were the main authority when it came to managing the creative process. Still, it is important to acknowledge the

dancers' contributions to the construction of the three pieces. The dancers were involved in generating and manipulating movement materials. They contributed ideas and helped solve compositional problems. Their involvement was very useful in eliminating blockage and maintaining the process flow.

Looking at the overall process, there was a constant shift between the didactic and democratic frameworks, moving from a more centralized approach to a more cooperative one (Butterworth & Wildschut, 2009, P.177). As McKechnie (2005) explains, the choreographer's role of initiator and arbiter of structures means they are "sometimes at the head of a centralized system; sometimes part of a more distributed system in which the thoughts and actions of individual artists contribute to a coherent and potent whole. Human cooperation harnessed in this way requires all parts of the system to contribute to the ongoing creation in whatever capacity is productive of positive outcomes" (from Grove 2005 p.93).

Notably, some scholars believe that collaboration compromises the quality of outcomes. They view it as a method that eradicates artistic genius or vision, leading to results that are "dulled into a bland, obscure banality" (Heaton 1995 & Frisch et al. 2002 from Butterworth 2012, p.199). However, I found the opposite to be true. The dancers' suggestions allowed for solving problems more quickly and efficiently, which enabled the process to flow more smoothly. The choreographers turned to the dancers for help when they felt stuck or when a solution could only be tried physically. Together, the group found new ways to progress and discovered solutions that were more organic and suitable. Thus, it seems that when there is shortage of time and the pressure to produce another original work is high, relying on the dancers' input can be most useful.

In her book *'Contemporary Choreography',* Butterworth (2012) also acknowledges the pragmatic benefits of group ensemble work and states that it is a central feature of the performing arts (p.199). She argues that it allows for "a particular kind of engagement, a shared vision, the sharpening of problem solving skills and accompanying discoveries that a single artist cannot achieve" (p.199). Indeed, nowadays it becomes more and more common to work in a way whereby the groups' input is maximized. Choreographers such as William Forsythe and Wayne McGregor intentionally create an environment in which the decision making is shared, including and utilizing the group's different perspectives and skills (Albrecht 2013; Butterworth 2009; Forsythe & Noë 2009; Vass- Rhee 2011). In

the present study, this inclusive approach was reflected through brainstorming sessions wherein the group discussed potential constraints and variables that promoted new concepts and solutions. This type of collaboration opened up a range of possibilities and sparked new ideas which may not have come about otherwise.

Brainstorming is one of the most well-known techniques for solving problem (Fernald & Nickolenko 1993; Leclef 1994; Stein 1975) and for increasing productivity of groups. It can dramatically improve idea generation and group engagement. In fact, one of the first advocates of this method, Alex Osborn, claimed that a group using brainstorming produced 44% more worthwhile ideas than individuals without the benefits of group discussions (Isaksen 1998). In dance though, not all problems are solved through discussions. As Glass (2004) argues, in contemporary dance, creativity is movement-based and material evolves from experimentation and exploration in the medium itself (Foster, 1976; Gardner, 1993; Hanna, 1979; Healey, 2004; Humphrey, 1959; Limon, 1955; McKechnie, 2002; Vaughan, 1990). In fact, Stevens & Leach (2015), who investigated 'bodystorming' and dance improvisation found that together dancers are able to generate a larger quantity of new ideas when compared to improvising on their own, and there was also a higher rate of satisfaction from the task and outcomes. Indeed, both interviews and observations revealed that the dancers' level of engagement and mental and physical search for adequate solutions played an important role in the structuring process and the final outcome.

10.9 Experience and Expertise

This chapter has demonstrated over and over again how the choreographers' expertise was reflected through their use of local, transitional, and process strategies. However, in this section their level of experience will be emphasized through their particular attitudes toward planning and their understanding of the creative process.

From interviews and observations it became clear that both choreographers did not plan each piece's structure in advance, despite having been given the instructions before the study commenced. Instead, they searched for a broad framework or general constraints that directed their creative process. In other words, they solved their ill-defined structuring problem in a selective "trial and error search" by applying

rules that narrowed down alternatives (Lewin & Shakun 1976, p.32). Once they had established a certain structure, they kept modifying the composition based on the obstacles and new directions that emerged (Carlson 2011; Nardi 1995; Suchman 1987). Experts in other fields seem to operate in a similar way, especially when confronted with ill-defined problems. According to Ormerod (2005) complex and large-scale problems defy exhaustive planning because of the combinatorial explosion of possible problem states, and therefore, experts use selective planning strategies. These strategies guide the appropriate steps to execute and provide strategic search of the problem-space for best-value moves under a progress-monitoring criterion without harming flexibility, which is an important element in creative problem solving. In his article, Ormerod acknowledges the significance of both domain knowledge and strategic knowledge as essential components of skilled problem-solving.

Interestingly, the two choreographers involved in the current study associated innovation and quality of outcomes with setting the right conditions (i.e., the right sound, space, collaborators). Particularly, they emphasized the importance of selecting the right creative team. They explained that collaborators play an important part in the decision-making process, and they are often capable of challenging fixed perceptions and understandings. Metaphorically speaking, creating the right working environment and recruiting the right team could be compared to "gathering clouds and certain atmospheric conditions" with the hope of forming a "thunderstorm" (Martin 2013, p.12). Expert choreographers, such as Twyla Tharp (2003) have also expressed the value of creating the right environment for creativity and inspiration to spark, and Wayne McGregor has explained how finding the right collaborators could challenge conventions by contributing their own knowledge and experience to the process (Zehnder, 2017). According to Marchand (2017), expert crafts persons are aware of the resources available to them and know how to orchestrate and exploit them when problems arise. Experts "interactively probe the world to help define and frame their problems" (Kirsh 2008, p.290). They become well attuned to constraints and affordances through regular practice in their working context (Barwise & Perry, 1983) and through interacting with their community of practice (Lave & Wenger, 1991). Thus, in order to solve problems creatively and innovate within their field of practice, experts need to put themselves in an environment that drives new solutions and challenges their methods of working.

10.10 Conclusion

The aim of this study was to investigate how expert choreographers structure and vary their dance pieces. Consequently, the choreographic processes of two expert choreographers were examined in an experimental setting wherein the structuring phase could be isolated and explored separately from other phases. The qualitative and quantitative data that was extracted from the study was analyzed and discussed in relation to literature in cognition, dance, and creativity. This chapter will highlight and summarize the main points of the discussion chapter and the main findings of the present study.

Choreographers begin their structuring process by sequencing a few movement sections. They evaluate the outcome and then gradually transform it by applying multiple strategies. This process continues until their goals and standards are met. Empirical evidence of choreographers' reliance on multiple strategies during the structuring phase was provided in the results chapters.

Being an ill-defined, complex problem, the choreographic process is often framed in a personal way. This means that choreographers identify general criteria and constraints for guiding their selection, organization, and refinement of movement materials. However, as they plunge deeper into the process and gain better understanding of their work, the constraints they work with become more defined.

During the creative process, choreographers shift between different modes of cognitive activity (making, observing, and analyzing) and between different modes of attention, focusing either on small details or on the overall structure, the present creation or previous works. Consequently, they identify different problems and apply various techniques for solving them. Local strategies enable change at the detail level, while transitional strategies enable change to the overall structure. Both types of strategies serve as practical tools for refining and varying the dance composition.

The combinations of strategies applied by choreographers in each process depend on the obstacles that emerge along the way. These strategies also reflect their personal preferences and tendencies. This means that some solutions are context-related while others may be more consistent. Yet, determining each choreographer's personal 'structuring style' requires examining their practice over several projects that involve different conditions. Interestingly enough, despite differences in strategy use, in this relatively short study, the two choreographers applied more local modifications than transitional, in particular,

local manipulations (this ratio may change in longer projects). Performing more micro than macro alterations enabled the choreographers to refine and develop their work rapidly and effectively without interrupting the creative flow.

The high number and variety of strategies the choreographers used in the present study indicates that strategic thinking is a key component of expertise. Expert choreographers seem to be solution-focused. By applying multiple strategies, choreographers can explore "the problem space thoroughly" (Yilmaz, 2011, p.407) until they achieve their compositional goals. The repetitive use of strategies points out that choreographers deliberately and consciously chose to use them in order to make changes both within and between structures. It also shows the importance of flexibility and sensitivity to the creative process (Runco 1994).

Expert choreographers identify problems and propose a solution conjecture quickly. Thus, the more time they spend on a piece, the more modifications they make. However, as opposed to the studies in creativity and design that were described in the general discussion, our results reveal that the quantity of strategies and solutions does not necessarily guarantee a better outcome. In fact, it seems as though achieving a more successful result is dependent on finding an appropriate framework. This is because the 'right' logic is guiding the decision-making process and organization of materials from the start. Yet, in order to better understand the implications time pressure and time away have on dance production and innovation, future studies should compare the outcomes of processes of different lengths. Results from such studies could provide the dance industry with the evidence needed for making more informed decisions about the distribution of rehearsal time and funding.

Lastly, while in this study the use of explicit strategies did not make much of a difference to the choreographers' structuring processes, innovation was enabled through the application of process strategies. These guided each choreographer's overall approach through the solution space, forcing changes in a specific direction. Despite the limitation of time and resources, combining several process strategies together allowed for generating a wider range of dance compositions with their own particular structure and character. Hence, becoming aware of these techniques and developing strategic knowledge can enhance choreographers' creativity and problem solving skills.

10.11 Study's Limitations

To date, very few studies have provided empirical evidence for explaining the use of strategies by choreographers during the structuring stage. This study aims to fill in the gap through its specific research method. However, it is important to acknowledge some of its limitations.

For instance, the choice to examine the work of choreographers in a relatively condensed experimental setting may have generated different results when compared to examining their structuring process in a 'real-life' situation where a single work is developed over many days or even weeks. While there is no doubt that most, if not all, structuring processes involve the use of multiple strategies, the patterns of strategy use may differ from the patterns presented in this study. This is because different variables such as: rehearsal time, theme, collaborators, movement material, and various production elements (e.g., lighting, music, set design, and costumes), could potentially affect choreographers' structuring decisions as well as use of strategies. Nonetheless, this more 'condensed' study provides a space for reflection which is not often afforded when preparing for a performance. With such reflection, a heightened awareness of oneself is granted as well as a form of insight developed through the practice itself (from Butterworth & Wildschut 2012).

This concentrated study design allowed for 'speeding up' the initial stages of the composition process so that the main focus remained on structuring and generating multiple dance compositions. It enabled thorough documentation and examination of the creative process of two choreographers, and the capacity to make comparisons between them without the interference of too many biases. This would not be possible in a more natural setting, as choreographers tend to work in different spaces over different periods of times and with different people, soundtracks, and themes.

While observing the creative process of a small sample allows for a profound examination of the structuring process, the larger question of the use of strategies by experts cannot be fully addressed. Therefore, the patterns of strategy use presented in this study should be verified in relation to other projects and choreographers before more general conclusions are made. For instance, while it is probably the case that all expert choreographers continuously shift their attention between the micro and

macro aspects of their work, whether they choose to attend more to local issues is something that needs to be examined by other researchers in the future.

Finally, combining quantitative and qualitative methods for collecting, sorting, and coding data ensured a more holistic view of the research topic. Yet, both systems have their own limitations. Testing the study's coding system by an external examiner did not show a 100% result. However, it did indicate a substantial level of agreement (70%) according to the Cohen Kappa Inter-Rater Reliability Testing (McHugh 2012). In addition, it is generally known that qualitative research is dependent on the individual skills and experience of the researcher and could be influenced by the researcher's personal biases and idiosyncrasies. The researcher's presence during data gathering is unavoidable in qualitative research and can affect the participants' responses. Still, without the researcher's presence, as often seen in more positivistic enquiries, subtleties and complexities are often missed. Therefore, understanding the structuring phenomena could only be done through close observations and analysis by the researcher.

10.12 Future Studies

New questions involving the structuring process and choreographers' use of strategies emerged as a result of the current investigation. Therefore, additional work is required to gain more clarity on the research subject.

The findings show that the study's design partially affected the participants' decision making. For example, the music the choreographers were given was very abstract and had no clear structure or pulse, therefore, only minimal structuring decisions were made based on the music. This may not be the case when working with a musical score that is more complex. Therefore, the extent to which the context influences the structuring process has to be verified before making broader conclusions about experts' approaches to structuring. Future studies may look into changing certain variables such as the music, number of participants, collaborators, space, and theme, in order to uncover how they affect the structuring process and to what extent.

Furthermore, making broader conclusions about structuring and the use of strategies for varying dance compositions requires examining the creative process of more than two choreographers. This will give

more validity to the findings and final conclusions. Still, exploring multiple processes requires a special study design that can systematically account for the different variables involved in the choreographic process.

Variables like rehearsing time and time away seemed to be important factors when it comes to creativity and problem solving. Thus, in order to discover the optimal conditions for creating work that is both innovative and high in quality, more research is required. Results from such studies could greatly benefit the dance industry, providing the evidence needed for making more informed decisions about the distribution of rehearsal time and funding.

Another aspect that could be explored further is the use of explicit strategies and their contribution to the structuring process. This study showed mixed results with respect to the ability of these strategies to support experts' creativity and productivity. However, that does not mean that novices cannot benefit from the conscious application of such strategies. Therefore, future studies may examine the structuring process of novices and the quality of their outcomes with and without the use of explicit strategies.

10.13 Application

The present study has demonstrated the value of expanding choreographic research by relating it to other branches of knowledge. By incorporating theories and studies from other fields such as cognitive psychology and design, the understanding of the structuring phenomena was enhanced. Considering the multi-modal and complex nature of choreography, other researchers may want to incorporate theories from other disciplines in order to thoroughly investigate the choreographic process.

The research methods that are presented in the current study offer new techniques for recording and coding transformation in design. These methods can be used by other researchers who wish to investigate the choreographic process and strategy use further. Moreover, the results demonstrate that the choreographic process can be studied more objectively and rigorously by collecting and analyzing quantitative data. Other dance researchers who are interested in enhancing the validity of their work, expanding their analytical perspective, and exchanging information with others may also find value in investigating choreography quantitatively.

Moreover, the information presented in this study could benefit experienced and novice choreographers alike, since becoming more familiar with structuring methods has the potential to increase creativity, innovation, and productivity during the structuring stage. The development of expertise in choreography may be facilitated by providing explicit instruction in structuring strategies in the early stages of training. This may lead to choreographers gaining skills to maximize the variety and novelty of their dance designs more quickly. Practitioners from other creative fields who practice problem solving in real time may also find use in these techniques, as they were found most helpful in overcoming fixation and blockage.

Lastly, decision-making in choreography is influenced by different variables (e.g., budget, rehearsing time, number and level of dancer, the attributes of the space, production elements, etc). In this study it was discussed how rehearsing time and time away affect the use of strategies, the quality of outcomes, and the choreographer's level of satisfaction of their work. Thus, policy makers can use this information when writing policies regarding rehearsing time, funding, and residencies.

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Appendix 1: Yilmaz et al. List of design heuristics

Rank	*Design Heuristics in Coding Set*	*Within Concept*	*Between Concepts*	*Total*
1	Attach independent functional components within the product (5)	145	6	151
2	Change where or how product will be used (3)	135	7	142
3	Vary physical directions for product approach	118	6	124
4	Reverse direction or angle of component for each function (17)	93	30	123
5	Use a common base or railing to hold multiple components	73	8	81
6	Control / change in function through movement	76	2	78
7	Create modular units by using repeat, substitute, or split (10)	64	6	70
8	Make components attachable and detachable	54	13	67
9	Apply an existing mechanism in a new way (2)	64	2	66
10	Use the same surface area for multiple functions (8)	56	7	63
11	Redesign components to add on, fold in, take out (14)	57	0	57
12	Attach the product to existing item as an additional component	49	7	56
13	Use a common component for multiple functions (6)	54	1	55
14	Adjust functions to needs of differing demographic (1)	50	2	52
15	Add portability (13)	40	2	42
16	Flip the direction of orientation (e.g., vertical to horizontal) (9)	28	13	41
17	Refocus on the core function of the product (7)	37	2	39
18	Split or divide surfaces into components (18)	31	7	38
19	Extend surface area for more functions	28	7	35
20	Nest (Hide/Collapse/Flatten) elements within each other (11)	32	0	32
21	Hollow out inner space for added component placement (12)	31	1	32
22	Unify elements, color, and graphics for cost and consistency	31	1	32
23	Rotate on a pivot axis (20)	26	6	32
24	Elevate or lower product base	31	0	31
25	Fold product parts with hinges, bends, or creases to condense	25	4	29
26	Scale size up or down (15)	21	7	28
27	Offer optional components and adjustable features	25	2	27
28	Align components around a central, main function	22	2	24
29	Change the geometrical form (circle, triangle, cylinder, etc.) (4)	12	12	24
30	Cover / Form Shell / Wrap surface for other use	18	5	23
31	Use the same material all throughout the product	22	0	22
32	Return sensory feedback to the user (tactile, audio, visual)	18	1	19
33	Remove product parts to increase fit during use	16	3	19
34	Slide components across product surface	14	4	18
35	Visually separate similar functions using size and/or color	16	1	17
36	Bend into angular or rounded curves (21)	16	0	16
37	Replace solid material with flexible material	12	3	15
38	Compartmentalize functions into distinct parts	12	1	13
39	Substitute / Swap an old component with a new design (16)	10	3	13
40	Change the surface material at points of human contact	8	3	11
41	Reduce the amount of material needed for the same function	9	0	9

Appendix 2: Ethics Approval

Locked Bag 1797
Penrith NSW 2751 Australia
Research Engagement, Development and Innovation (REDI)

WESTERN SYDNEY UNIVERSITY

REDI Reference: H11809
Risk Rating: Low 2 - HREC

HUMAN RESEARCH ETHICS COMMITTEE

13 October 2016

Professor Kate Stevens
The MARCS Institute

Dear Kate,

I wish to formally advise you that the Human Research Ethics Committee has approved your research proposal H11809 "The Pragmatic Nature of Creativity", until 31 May 2018 with the provision of a progress report annually if over 12 months and a final report on completion.

Conditions of Approval

1. A progress report will be due annually on the anniversary of the approval date.

2. A final report will be due at the expiration of the approval period.

3. Any amendments to the project must be approved by the Human Research Ethics Committee prior to being implemented. Amendments must be requested using the HREC Amendment Request Form: http://www.westernsydney.edu.au/__data/assets/pdf_file/0018/491130/HREC_Amendment_Request_Form.pdf

4. Any serious or unexpected adverse events on participants must be reported to the Human Ethics Committee via the Human Ethics Officer as a matter of priority.

5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the Committee as a matter of priority

6. Consent forms are to be retained within the archives of the School or Research Institute and made available to the Committee upon request.

Please quote the registration number and title as indicated above in the subject line on all future correspondence related to this project. All correspondence should be sent to the email address humanethics@westernsydney.edu.au.

This protocol covers the following researchers:
Kate Stevens, Scott DeLahunta, Amanda Card, Maya Gavish

Yours sincerely

[redacted]

Professor Elizabeth Deane
Presiding Member,
Human Researcher Ethics Committee
Western Sydney University

Appendix 3: Participants Information Sheet & Consent Form

Human Research Ethics Committee
Office of Research Services

WESTERN SYDNEY UNIVERSITY

Participant Information Sheet (Choreographers)

Project Title: The Pragmatic Nature of Creativity

Who is carrying out the study?

This study is being conducted by Maya Gavish and supervised by Prof. Catherine Stevens from the MARCS Institute for the Brain,Behaviour and Development, Western Sydney University.

What is the study about?

The purpose is to investigate problem solving in the choreographic process.

What does the study involve?

The study will be conducted in Sydney Dance Company, Walsh Bay (studio 3) between the 26/6/17-30/6/17 (Monday- Friday), 9am-5pm, including 40 minutes lunch break and 2 short breaks per day.

You will be asked to work with a group of 5 dancers on a few choreographic tasks:

- Day 1: generate movement material based on the theme 'Polarities' (you are welcome to interpret it as you please)
- Day 2-5: generate multiple dance designs of 3 minutes long out of the movement materials you created during day 1.

We will provide you with a soundtrack (atmospheric sound with no clear structure). However, you may also choose to work with no music at all.
The researcher will interview you a few times each day in regards to your creative process (The interviews will take place within the 8 hours time frame and will be about 10 minutes long).
With your consent, the process will be observed by one researcher and recorded with a video device.

Will the study benefit me?

- This experiment provides a platform for stretching one's creativity and examining one's own decision making procedures. Because it focuses on the creative process, it allows for experimentation and playfulness without the pressures involved in producing a dance piece for a performance.
- Once you have completed the study the researcher will explain to you its purpose. This will give a sense of experimental methods used in cognitive science. The results of the experiment will

contribute to current literature in dance by explaining the type of cognitive procedures involved in solving problems during choreographic processes.

- You will receive a payment of $1400 per 5 days of participation.

Will the study involve any discomfort for me?

No discomfort is expected and you have the option to withdraw at any time. If you decide to withdraw your payment will be calculated according to the number of days you participated in this project.

How is this study being paid for?

The research is funded by the MARCS Institute, Western Sydney University.

Will anyone else know the results? How will the results be disseminated?

All aspects of the study, including results, will be pooled. The pooled results will be reported in journal articles and conference papers. Video recording will be used of research purposes and conference presentations. You may ask to view the video recordings.

Can I withdraw from the study?

You can withdraw at any time without penalty.

What if I require further information?

If you would like to know more at any stage, please feel free to contact Maya Gavish from the MARCS Institute (Email: M.Gavish@westernsydney.edu.au)

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services.
Tel +61 2 4736 0229
Fax +61 2 4736 0013
Email: humanethics@westernsydney.edu.au.
Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Ethics approval no': H11809

If you agree to participate in this study, please sign the Participant Consent Form.

Participant Consent Form

Project title: The Pragmatic Nature of Creativity

I,……....., consent to participate in the research project titled 'The Pragmatic Nature of Creativity'.

I acknowledge that:

I have read the participant information sheet and have been given the opportunity to discuss the information and my involvement in the project with the researcher.

The procedures required for the project and the time involved have been explained to me, and any questions I have about the project have been answered to my satisfaction.

I consent to the participation in:

- interviews and filling up questionnaires
- 5 days of 'choreographic lab', 26-30 June, 2017 (9am-5pm, 40 hours in total)
- background questionnaire
- video recording of my participation.

I understand that information gained during the study may be published and therefore (please select):

1. give permission to the researcher to use my real identity

or

2. ask not to disclose my identity.

I understand that video recordings will be used for research purposes and conference presentations.

I understand that I can withdraw from the study at any time, without affecting my relationship with the researcher/s now or in the future.

Signature	
Name	
Date	

Return to email: M.Gavish@westernsydney.edu.au

This study has been approved by the University of Western Sydney Human Research Ethics Committee. The Approval number is: H11809

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services on Tel +61 2 4736 0229 Fax +61 2 4736 0013 or email humanethics@uws.edu.au. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Participant Information Sheet (Dancers)

Project Title: The Pragmatic Nature of Creativity

Who is carrying out the study?

This study is being conducted by Maya Gavish and supervised by Prof. Catherine Stevens from the MARCS Institute for the Brain, Behaviour and Development, Western Sydney University.

What is the study about?

The purpose is to investigate problem solving in the choreographic process.

What does the study involve?

The study will be conducted in Sydney Dance Company, Walsh Bay (studio 3) between the 26/6/17- 30/6/17 (Monday- Friday), 9am-5pm, including 40 minutes lunch break and 2 short breaks per day.

You will be asked to work with a choreographer and 4 other dancers on a few choreographic tasks, mainly generating movement material and shaping it into multiple dance designs.

- You are encouraged to contribute creatively to the process and work collaboratively with the other participants.
- You will be asked to fill-in questionnaires a (within the working hours) in regards to the creative process and your professional background.
- With your consent the experiment will be observed by one researcher and recorded with a video device.

Will the study benefit me?

Participating in this project will give you the opportunity to work with a choreographer of high calibre as well as other professional dancers.

- This 'choreographic lab' examines the choreographic process without the pressures involved in producing a dance piece for a performance which allows for experimentation and playfulness.
- Once you have completed the study the researcher will explain to you its purpose. This will give a sense of experimental methods used in cognitive science. The results of the

experiment will contribute to current literature in dance by explaining the type of cognitive procedures involved in solving problems during choreographic processes.
- You will be reimbursed for travel expenses amounting to $50 per day. You will receive the payment at the conclusion of day 5.

Will the study involve any discomfort for me?

No discomfort is expected and you have the option to withdraw at any time. If you decide to withdraw your payment will be calculated according to the number of days you participated in this project.

How is this study being paid for?

The research is funded by the MARCS Institute, Western Sydney University.

Will anyone else know the results? How will the results be disseminated?

All aspects of the study, including results, will be pooled. The pooled results will be reported in journal articles and conference papers. Video recording will be used for research purposes and conference presentations. You may ask to view the video recordings.

Can I withdraw from the study?

You can withdraw at any time without penalty.

What if I require further information?

If you would like to know more at any stage, please feel free to contact Maya Gavish from the MARCS Institute (Email: M.Gavish@westernsydney.edu.au)

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services.
Tel +61 2 4736 0229
Fax +61 2 4736 0013
Email: humanethics@westernsydney.edu.au.
Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Ethics approval no': H11809

If you agree to participate in this study, please sign the Participant Consent Form.

Appendix 4: Interview Questions

Day 1

1. Complete the following sentence. I'd like to make more that is….
2. After reading the information sheet, what were your thoughts?
3. Did you make any plans for today's process?
4. Describe today's process and concept development.
5. How did you feel about working with the given constraints? (music, number of dancer, the space, the theme itself, the time allocated for generating movement material)
6. Is today's process representative of your usual process?
7. What are your compositional ideas/plans at this point? Do you have any plans for the process to come?
8. What do you focus on when you create a new piece? What did you focus on today?
9. Do you have anything else to add before we conclude this interview?

Day 2

1. Do you have any new thoughts about yesterday's process?
2. Did you make any plans for today's process?
3. Can you describe today's process?
4. What are your plans in terms of structuring the movement material into a 10 minutes piece?
5. How were decision made?
6. Did you encounter any compositional problems in the last process? How did you deal with these problems?
7. How do you usually go about selecting the 'right' structure for the piece?
8. Do you have anything else to add before we conclude this interview?

Day 3

1. Do you have any new thoughts about yesterday's process?
2. Did you make any plans for today's process?
3. Can you describe today's process? How did you go about structuring the material into a 10 minutes piece?
4. How were decision made?
5. Did you encounter any compositional problems in the last process? How did you deal with these problems?
6. How do you feel about working with the music, dancers and theme?

9. Do you have anything else to add before we conclude this interview?

Day 4

1. Do you have any new thoughts about yesterday's process?
2. Did you make any plans for today's process?
3. Can you describe today's process? How did you go about structuring the second piece? Can you explain how it differs from the previous piece?
4. How did you feel about working with the nesting strategy? How did it affect the creative process and choreography? How do you feel about the final outcome?
5. How were decision made?
6. Did you encounter any compositional problems in the last process? How did you deal with these problems?
7. Do you have anything else to add before we conclude this interview?

Day 5

1. Do you have any new thoughts about yesterday's process?
2. Did you make any plans for today's process?
8. Can you describe today's process? How did you go about structuring the third piece? Can you explain how it differs from the previous pieces?
9. How were decision made?
10. Did you encounter any compositional problems in the last process? How did you deal with these problems?
11. Can you describe which piece out of the three you prefer the most and why?
12. Do you have anything else to add before we conclude this interview?

Appendix 5: Dancers' Questionnaires

Day 1

1. Describe today's process and concept development.
2. What was the dancers' contribution to the creative process?
3. What sort of problems arose during the creative process and how were they solved.

Day 2

1. How was the material from day one used to form a complete piece?
2. How were decisions made? What was your contribution to the compositional process?
3. Did any compositional problems arise during the last process? How were these problems dealt with?

Day 3

1. How was the material from day one used to form a complete piece?
2. How were decisions made? What was your contribution to the compositional process?
3. Did any compositional problems arise during the last process? How were these problems dealt with?

Day 4

1. How was the material from day one used to form a complete piece?
2. How does the last piece differ from it preceding?
3. Can you describe the process of working with the 'nesting' strategy? How did it affect the creative process and choreography?
4. How were decisions made? What was your contribution to the compositional process?
5. Did any compositional problems arise during the last process? How were these problems dealt with?

Day 5

1. How was the material from day one used to form a complete piece?
2. How does the last piece differ from it preceding?
3. How were decisions made? What was your contribution to the compositional process?
4. Did any compositional problems arise during the last process? How were these problems dealt with?