UNIVERSITY OF SOUTHAMPTON

FACULTY OF HEALTH SCIENCES

TURNING THE GAZE INTO SOMETHING THAT CAN BE SEEN, HANDLED AND EXPLORED: AN EXPERIMENTAL APPROACH TO UNDERSTANDING THE NURSING GAZE THROUGH THE UTTERANCES AND EMOTIONAL PROSODY OF EXPERT AND NOVICE NURSES

by

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ABSTRACT

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Articulating what nursing is and what nurses do, has been a challenge since the creation of the profession. This research draws on technology to solve the issue of revealing and investigating the tacit nature of nursing through the concept of the nursing gaze.

Drawing on the visual attention of nurses, this two-phase experiment identified that the nursing gaze is complex but can be identified with eye tracking and verbal utterances. Both phases of the study utilised videos of simulated nursing practice that acted as the stimulus for viewing.

The practical challenges of tracking eye movement and verbal utterances when stimulus is video was identified and led to the development of *Gaze-to-Text* to solve these. This novel method drew on ethnographic techniques to combine both eye movement and verbal utterances of novice identifying the tacit nature of the gaze. Concurrent eye tracking and recording of the viewers 'think aloud' commentaries led to the identification of eight verbal performative signifiers used by nurses to judge the behaviour and actions. Analysis of both novice and expert nurse's eye movement demonstrated areas of convergence and divergence and when combined with the verbal utterances, allowed conclusions to be drawn about the cognitive and perceptive processes involved in the nursing gaze.

The findings of the study have implications for developing novice nurses through the articulation of expert nurses gaze. The method of *Gaze-to-text* offers potential for understanding visual attention and the tacit elements of professionals in other fields.

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Declaration of Authorship

I, Susan Jane Faulds declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

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I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signed:

Date: 11 July 2018

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Finally, thank you to my family who have been with me every step of the way, accepting the weekends working and the endless requests for cups of tea and quiet.

This work is dedicated to the memory of my father, John Faulds.

Definitions and Abbreviations

Area of interest (AOI)	Defined areas on the stimulus that can then be tracked and identified by the eye tracker.
Cue	A signal that prompts an action or event
Emotional prosody	The melodic and rhythmic components of speech that listeners use to gain insight into the message of the speaker
Expert	An expert is a person whom through experience has developed an extensive knowledge base within a field and the cognitive and perceptive abilities to gain a level of skill where they no longer rely on analytical principles to connect and understand the situation.
Fixation	Eye tracking measure - the viewer is looking at one point for greater than 150 milliseconds as detected by the eye tracker.
Novice	For the purposes of this study, a student in year one of a pre-registration nursing programme.
Nursing gaze	A specific way of seeing, knowing and describing situations for the purpose of determining engagement of the nurse. It encompasses what the nurse brings with them to the situation; it is an active gaze that incorporates a tacit understanding and encompasses many complexities, not all consciously known to the holder.
Performative	Intended performance of an utterance.
Rule	An accepted principle or instruction that states the way things are or should be done, what you are allowed or are not allowed to do
Saccade	Eye tracking measure - rapid eye movement from fixation to fixation.
Segment	A number of scenes combined.
Scan pathway	Eye tracking measure, path of eye movement, measuring saccades.
Scene	A portion of the video measured in seconds.
Thinking aloud	Verbal protocol used to illicit viewers' thinking.

Chapter 1 - Introduction

1.1 Introduction to the Thesis

Visual assessment is an integral aspect of nursing practice. Nurses look at patients, clinical scenes and situations making decisions based on what they see, but what are they looking at? What do they see? How do they interpret what they see? This thesis addresses these problems through the creation of a methodology that enables the identification and articulation of what nurses look at and what they see. Revealing the *seeing* of both novice and expert nurses contributes to the understanding of nursing and adds to the development of nursing scholarship.

The first chapter of this thesis provides the foundation for this study, which seeks to explore nurses' visual assessment through developing a theoretical framework of the nursing gaze. Drawing on ethnographic techniques, a two-phase experimental study was created to explore the differences in visual behaviour between novice and expert nurses. In order to do this it is important for the scene to be set, the problem identified, and consideration given as to why I am the right person to explore this topic and why now. This chapter therefore starts with consideration of the problem, offers a debate of nursing practice and introduces visual assessment and its integral role within nursing practice. The chapter then moves to explore the knowledge base of nurses, how the concept of the 'nursing gaze' is defined. This is then employed to develop a theoretical understanding of nurses' visual attention, and ultimately contribute to the understanding of the uniqueness of nursing. The chapter concludes with the research question and aims that guided this study, arguing that identification of the nursing gaze can illuminate the uniqueness of nursing through the identification of tacit and embedded knowledge held by nurses.

1.2 The Problem - What is Nursing?

Nursing is a profession with a long and complex history, moving from a traditional caring role to the model of modern nursing, which itself is under debate. At the time of writing, the Nursing and Midwifery Council (NMC) standards for pre-registration nursing are being rewritten and a new apprenticeship scheme has commenced. The unprecedented changes in healthcare, its standing, provision, and internal and external politics, all add to pressure on the profession and those within. One aspect of this challenge is due to the long-standing difficulty in defining what nursing is, and demonstrating outcomes. Those of us who are passionate about nursing and the role it plays in contributing to patient outcomes, fear for the erosion of nursing as a profession and the

blurring of its boundaries. If we are to continue to defend nursing as a profession then we need to articulate what it is, and with the difficulty in defining nursing, how can we argue for its continuation as a profession? Amidst the challenges of doing so, it is important to develop a greater understanding of the uniqueness that nursing offers. This in turn will support the development of those new to the role by enabling the articulation of nursing.

Illustrating the difficulty in explicitly saying what nursing is, and does, is in part due to the variations in definition, which exist. The Royal College of Nursing (2014) offers a definition of nursing focused on judgement, and defines nursing as:

> The use of clinical judgement in the provision of care to enable people to improve, maintain, or recover health, to cope with health problems, and to achieve the best possible quality of life, whatever their disease or disability, until death.
>
> Royal College of Nursing (2014, p.3)

In contrast Barrett (2002) focuses on the knowledge of the nurse with a definition which reflects the intricacies associated with what nursing 'is', and therefore what it is that nurses 'do'. Barrett defines nursing as:

> …a basic science and the practice of nursing as the scientific art of using knowledge of unitary human beings who are in mutual process with their environments for the well-being of people.
>
> Barrett (2002, p.51)

Other definitions include both verb and noun classifications, and Lawler draws on embodiment to suggest that:

> Nursing practice is essentially and fundamentally about people's experiences of embodied existence, particularly at those times when the body fails to function normally.
>
> Lawler (2006, preface)

To claim nursing in its own right, a greater understanding of 'nursing' as an action needs to be explored and identified. Nursing is unique and performed (I use this word in the belief that nursing can be a noun) with a set of skills that are characteristic of the nurse. As Lawler argues:

> I am also more convinced than ever that the debate over whether nursing is (or can be) a science, or an art, or some mixture is really no argument at all. Nursing is none of these, though people are trying to make it look scientific. I think we should get on with the business of articulating what a rich and interesting discipline it is, and just call it nursing.
>
> Lawler (2006, preface)

It can be argued that defining nursing is not necessary for nursing to continue, yet if one cannot define it, how can nurses and educators appropriately and adequately support the learning and

development of those within and those wishing to enter the profession? This is a question that I have also asked myself, and with the changing landscape of health care provision, what nursing is and does changes. In essence, my belief is that nursing is a dynamic professional role that adapts and evolves to address and meet the needs of those who require support and care. This may be adopting roles traditionally associated with medicine or evolving the nursing role as health care demand changes. What remains unchanged is the public's and professional body's demands for competence at the point of registration, with registrants who are lifelong learners providing the highest level of patient care (NMC, 2016). Since the time when Florence Nightingale established nursing as a caring profession, much debate has been focused on what nurses do. At its core it is considered to be a caring profession, but what does this mean and what does it look like? How are nurses different from medical doctors or physiotherapists? How and what do nurses claim to be unique to nursing? When I qualified as a registered nurse in 1996, I was unable to take on roles such as administering intravenous medication or to take blood (phlebotomy), yet now these are considered essential skills that the nurse must quickly develop at the point of registration. They are no longer 'advanced' and therefore out of the reach of a nurse, and with each iteration of the Nursing and Midwifery standards, new skills are included which are no longer solely the domain of the medical profession. But what does this mean for nursing? Being able to develop these 'advanced' skills provides opportunities for enhancing patient care but they must be delivered with the recognition that as a nurse I am providing this care. With the changes to the junior doctors working hours (EU, 2009) a gap emerged which resulted in a complex and messy workforce where titles and associated tasks and responsibilities depended on who is setting them (Learly et al., 2017). With nursing and nurses changing, how do we define nursing? What is it that makes us unique as a profession? The problem may however be that we are trying to define something that needs redefining and consideration needs to be given to the changes that have moved nursing into the present.

At this point it may be considered that 'the problem' is how to define nursing, but this is only one aspect. Through revealing what nurses look at and see when practicing, one should be able to articulate their 'working' knowledge and skill. Enabling articulation and understanding in this way for nurses at each stage of their journey can be encouraged and supported to develop their own understanding of nursing. The preceding thoughts forms the premise on which this study is based. The first challenge that emerged was identifying a way in which this could be approached. Drawing on a post-structuralist stance, which recognises the presence of multiple voices, views and methods when analysing reality, both supports the inclusion of multiple voices, as well as offering a way in which to represent and interrogate these; this is addressed in chapter three. This study proposes that using a post-structuralist stance, and drawing on Foucault's concept of the

gaze, will generate new knowledge that can be used to support the articulation of what nursing and nurses do. Each of these concepts will be revisited and developed throughout this chapter to ensure that a shared mental model of what, for the purposes of this thesis, is referred to by the term 'nursing gaze'. First, this concept requires positioning within both clinical practice and nurse education.

1.3 Vision and Seeing in Nursing

Visual assessment has the potential to provide the nurse with information if they know what they are observing and why, and it is a skill that nurses require in order to gather information that they can act on. As Florence Nightingale argued:

> The most important practical lesson that can be given to nurses is to teach them what to observe-how to observe-what symptoms indicate improvement-what the reverse-which are of importance-which are of none-which are the evidence of neglect-and of what kind of neglect.
>
> Nightingale (1860; 2017, p.58)

However, the ability to use the information in a meaningful way demands active and reflective experience and education (Usher, Bryant and Johnston, 1997). How does the nurse know that the patient they are observing requires attention and what that may mean? Visual attention has long been studied as a method of what we see, how we see, and how we construct the world around us. It allows us to observe and engage in the world through a shared understanding and culture (Berger, 1972; Rose, 2012). An important aspect of visual attention is what Polanyi (1966) refers to as the 'tacit'; the action as a consequence of everything that has come before, including knowledge held about the object/situation or phenomenon (focal knowledge) and knowledge that is used as a tool to handle or improve what is in focus (tacit knowledge). Here, tacit knowledge functions as background knowledge that can be unconsciously drawn on to assist in the accomplishment of a task. Polanyi (1966) gives the example of facial recognition; when we see a person across a crowded room and have previously met them then we will often recognise their face without consciously considering every element of their features. We do not need to consider the shape of their nose or the colour of their eyes as we holistically recognise them. If then asked to say how we recognised the person, we may be able to vaguely suggest their facial features, but this tacit knowledge has acted as a background to assist in the accomplishment of the task (Polyani, 1966). Nursing demands that the nurse draws on and builds such focal and tacit knowledge. Knowledge is assimilated into the body, becoming an extension of the individual who ceases to be aware of what they know, and instead becomes spontaneously skilful, knowledgeable and adaptable to the situation (Merleau-Ponty, 1962; Carlsson et al., 2002). Benner (1984, p.43) referred to this as clinician's knowledge being 'embedded in perceptions

rather than precepts.' Benner's (1984) seminal work explored the theoretical understanding of nursing competence and described five broad stages in the development of clinical nursing skills; novice, beginner, competent, proficient and expert. Benner's work (1984), based on the model of skills acquisition from Dreyfus and Dreyfus (1984), used an interpretive approach to develop a rich description of actual nursing practice. Throughout Benner's work, there is reference to embedded practice that becomes visible through the nurse's discussion and accounts of clinical practice. Using vignettes, Benner (1984, p.36) was able to identify 'clinical situations where their interventions made a difference' therefore making some of the embedded knowledge in their practice visible.

Scholes (2006) also drew on vignettes to illustrate expertise in critical care nursing and used the example of watchful waiting. Here the nurse is watching and waiting without intervening; they are drawing on their experience and clinical grasp of the situation to know when to 'jump in' and when to 'hold back'. Again, vision and seeing is key to Scholes' exploration of nursing and nursing practice. Whilst Benner and Scholes used interviews, observations of clinical practice, and vignettes, technology has developed allowing opportunities to make this 'invisible' 'visible'. This was the theoretical starting point for this study as 'with visibility, enhancement and recognition of expertise becomes possible' (Benner, 1984, p.36). Consideration of this literature led to the question: 'can the visual assessment skills of nurses be used as medium to explore and develop the nursing gaze?'

1.4 Developing the Concept of the Nursing Gaze to Address the Problem

The preceding discussion has argued that nursing is complex and that there is a tacit element that whilst difficult to articulate, holds opportunities to understand the visual behaviour of nurses. This thesis argues that identification of the nursing gaze can be used to: (1) illuminate the uniqueness of nursing through the identification of tacit and embedded knowledge; and (2) support the development of nursing students and move them beyond what they know. The challenge is then how to do this. Whilst nursing has changed over my career, one key aspect is that nursing involves, and is dependent upon, looking and seeing, whether looking at the patient, their notes, equipment, or context etc., and making judgements and decisions as to what is being seen and how to act or react. Vision is an important sense, and arguably the most important in nursing as it is fundamental in how we come to know the world and how it is culturally constructed (Rose, 2012). Looking at a patient can provide an abundance of information if the viewer knows what they are looking at and why, but this comes with experience and education. This visual assessment is a form of visual attention, where the gaze is more than just looking and seeing, it is a wider, more holistic gaze. Foucault, in *The Birth of the Clinic* (1989), refers to this as

'the gaze', indicating a change in the medical professions' perspective, which is moving from objectification of the patient to considering the wider more holistic elements. Foucault defines the gaze as:

> A perceptual act sustained by logic of operations; it is analytic because it restores the genesis of composition; but it is pure of all intervention insofar as this genesis is only the syntax of the language spoken by thing themselves in an original silence. The gaze of observation and the thing it perceives communicate through the same Logos, which, in the latter, is a genesis of totalities and in, the former, logic of operations.
>
> Foucault (1989, p.133)

The gaze, in Foucault's use of the term, is much more than vision; it encompasses everything about the holder of the gaze, their purpose, standing, social, cultural and political, tacit and focal. Foucault refers to the medical gaze with the doctor as the cultural agent, socialised through training into ways of approaching and confronting situations, demonstrating that the way illness and disease are understood in turn promotes certain ways of treating and excludes others, thereby exposing the discursive nature of value free concepts (Cheek and Porter, 1997). The gaze provides the physician with the ability to see beyond that, which prior to the eighteenth century was not visible, as pathological anatomy emerged as a new science. Foucault (1989) contrasted this new scientific gaze with the subjective, surface gaze of earlier generations, moving past the limitations of the patient's narrative (Shapiro, 2002). The gaze moved away from the holistic approach to the scientific, suggesting anything that could not be seen was not important, and while the clinical gaze that Foucault specifies has the power to diagnose pathology more accurately and efficiently than the approaches that had come before, it does not encourage individualised recognition of the person. Rather it is what is scientifically known and correct; a powerful gaze that dismisses the subjective nature of the patient's health and means that they are a passive receiver of the gaze. The holistic nature that had previously existed lost its position in determining the truth, and Shapiro (2002) believes that the clinical gaze can be a valuable instrument. Not only as an agent of dehumanising, (a criticism of the medical gaze at the beginning of modern medicine identified by Nightingale in 1969) but by including everything, it can repair and re-humanise. Benner (1984) talks of understanding practice and practical knowledge, particularly at the expert level, as needing to be undertaken holistically, drawing on the context and possible meanings of the situation. The nursing gaze can therefore not be divorced from the context or the antecedent factors; in fact, they are vital in understanding the limits of the nursing gaze.

The starting point is to consider what the nursing gaze is, and to ensure that there is a shared mental model. Whilst there is an argument that the nursing gaze may be specific or an integral part of the medical gaze, a valid conjecture is that similarities exist as the object of the gaze may

be the same and as due to the elements of the context in which it is applied, the training, education and socialisation of both professions. There has been limited work exploring the nursing gaze but according to Ellefsen et al. (2007) the nursing gaze is:

> A specific way of seeing, knowing and describing clinical situations.
>
> Ellefsen et al. (2007, p.102)

For Ellefsen et al. (2007), the nursing gaze is revealed within the ontology of clients and practice. Placed at the beginning of their descriptive theory of nursing, the nursing gaze is followed by clinical construction and clinical engagement. The nursing gaze is manifold and complex, and Ellesfen et al. (2007) see it to be guiding and limiting the nurse's assessment and engagement in clinical practice.

Tait (2009, p.232) refers to this as the 'professional gaze', placing it firmly in the specific context of decision-making, and defines it as 'the professional practice of engaging in scanning, selective perception, recognition, diagnosis of and response to clinical deterioration.' This has similarities to the foundations of the medical model, identifying, drawing on and weighing facts, but Tait encompasses the process that nurse's function within to achieve outcomes for patients. Foucault's scientific stance, which is reflected in that of Tait, is not the only approach to defining and interpreting the gaze, as Shapiro (2002) uses the literature to explore other forms, which include the patient gazing back, something that Foucault did not. Shapiro (2002) recognises the importance of Foucault's work as making the existence of the gaze known, but suggests that there are other permutations of the gaze, each with its own purpose and potential for harm: the ordinary gaze, which may lack awareness and intentionality; the voyeuristic gaze, which has as its aim gratification and not the assistance of the patient; the avoidant gaze, well-intentioned but rooted in the need to prevent connection with the patient; and the patient gazing back, where the unskilled or scientific gaze of the physician is met with the patient's gaze. Shapiro uses examples from the literature to demonstrate the difficulty of shifting the nature of the gaze to a more humanising direction, and suggests that the witnessing gaze and the gaze of recognition are kinds of gaze which may enable this move.

The preceding debate provides a theoretical standing on which to proceed and develop a working definition of the nursing gaze. There is no shared mental model within the literature, although there are eight points of agreement:

1. That there is a gaze
2. There is a holder of the gaze who brings with them their experience and tacit knowledge
3. It is a perceptual act
4. It has a cognitive element
5. It abides by principles of validity
6. It demands that the viewer understand the language, i.e. how to interpret what is being seen
7. There is a motivation to act on the information gathered
8. The gaze is greater than the sum of the parts (Gestalt)

Drawing on the concept of Foucault's gaze, whilst also recognising the complexities and opportunities in that of Shapiro's and Tait's, and the positioning of the interpretation of Ellefsen et al., this study defines the nursing gaze as:

> ***Embedded in nursing practice the nursing gaze is a specific way of seeing, knowing and describing situations which draws on the known and the tacit to determine the engagement of the holder with the object of the gaze.***

This working definition identifies the complexities of the gaze, recognising that what the nurse brings with them to the situation is key, as this defines the engagement and interaction. As previously discussed, this may be seen in the visual assessment skills of a nurse when directed at a patient or it may be in the wider sense, the nurse observing practice, knowing when to and when not to act.

1.5 Development of the Gaze through Experience

Development of expertise is considered within this study as a vehicle for exploring the gaze, and a means of illuminating and investigating it.

This thesis proposes that the identification of the gaze through the experts' eyes will enable articulation to itself and its novices. Key concepts of expertise, its characteristics and development, have been synthesised within this chapter and presented as the operational definition of these terms. This review is not intended to be a formal critique, rather an evaluation of the identified concepts with the aim of understanding what is known, how new knowledge may be gathered, and how this may be used to explore the nursing gaze. Instrumental to this was work by Patricia Benner and colleagues, whose seminal work dominates the literature related to nurses and their acquisition of skills and expertise. I was familiar with the seminal work of Dreyfus and

Dreyfus (1986) from a previous study, and when combined with Hoffman's renowned work, as well as that of Benner's, then this provided a solid foundation on which to proceed.

There is debate within the literature concerning the definition of expert and expertise; however, recognition of expertise as a concept has been acknowledged as far back as Ancient Greek society when Plato emphasised the importance of expert knowledge:

> I observe when a decision has to be taken at the state that assembly about some matter of building, they send for the builders to give their advice about the buildings, and when it concerns shipbuilding they send for the shipwrights, and similarly in every case where they are dealing with a subject which they think they can be learned and taught. But if anyone else tries to give advice, whom they don't regard as an expert, no matter how handsome or wealthy or well-born he is, they still have none of him, but jeer at him and create an uproar, until either the would-be speaker is shouted down and gives up of his own accord, or else the police drag him away or put him out on the order of the presidents.
>
> Plato (2002, pp.11-12)

Since the beginnings of Western culture, there has been an interest in the knowledge of experts and how it can be used to develop that of others (Ericsson, 2013). The experts, by their position, have demonstrated knowledge and often ability that is superior to that of others in their domain. There has long been a tradition of apprentices learning from an expert (or master), thereby recognising that skill or knowledge can be learnt and passed down (Ericsson, 2013; Hoffman, 2013), as articulated to the novice from the expert (Gobbi, 1984). Understanding what and how experts know, how they organise their knowledge, and their performance, may open opportunities to enable the novice to develop their own and to gain a deeper understanding of the development and mediation of expertise; developing a conceptual framework on which to develop their own experience and meaning. However, the assumption is that the expert is able to articulate their knowledge, its organisation and performance, but what if they cannot? This is a key question that is revisited when considering the development and articulation of the nursing gaze.

Swap and Leonard (2002) contend that there are four characteristics of expertise: firstly, pattern recognition, rules of thumb and context; secondly, the tacit nature of expert knowledge; thirdly, efficiency and abstract reasoning; and finally, extrapolation from the known to the unknown. Others have purported that additional characteristics are associated with experts; Shanteau (1992) gives an extensive list including abilities, motivations and knowledge, while Glaser and Chi (1998) include reference to time and memory, and Cellier et al. (1997) note seeing meaning and more complete representations of a task. These characteristics are associated with improved outcomes through greater success in decision making when compared to a non-expert individual

or group (Ericsson et al., 2006). However, experts are not always right and may fail despite their status. Shanteau (1992) and Farrington-Darby and Wilson (2006) suggested that experts are no better at decision making than novices or statistical models. Whilst this is recognised, and acknowledged, it is not within the remit of this study to discuss this further at this point. Instead, the premise that there are observable characteristics associated with the 'expert', and their gaze, is observable and worth exploring.

1.5.1 Progression towards Expertise

In order to understand the value of expertise in articulating the nursing gaze, it is important to consider how it is developed. Whilst there is agreement within the literature that it is a process that consists of hierarchal involving stages, there is no agreement on how many stages there are. Fitts and Posner's (1967) model contains three phases, while Dreyfus and Dreyfus (1980) propose five stages, and Hoffman (1996) six (figure 1)

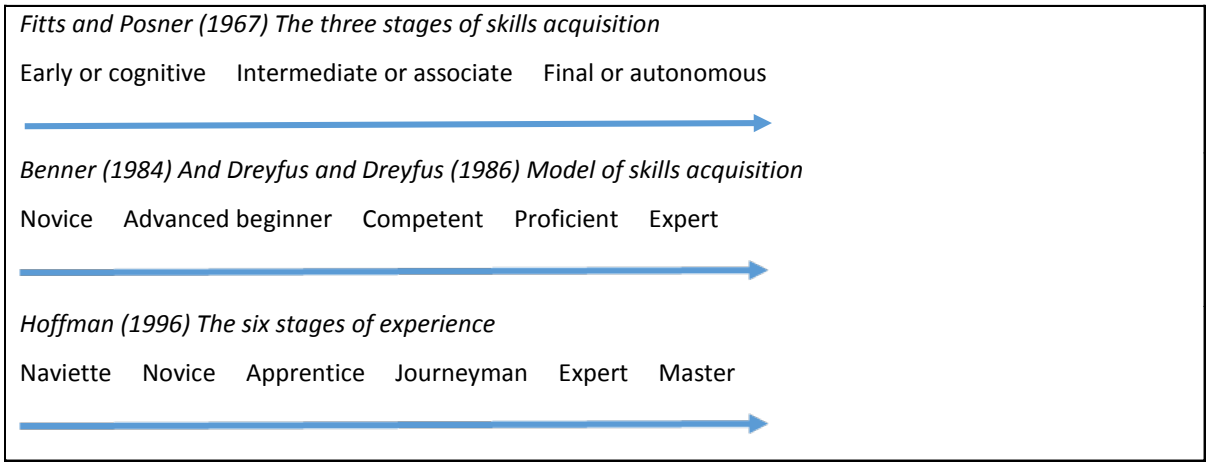


Figure 1 Stages of developing expertise

Source: Fitts and Postner (1967), Dreyfus and Dreyfus (1986), and Hoffman (1996)

Fitts and Posner's (1967) model contains three phases in the development of a skill: the early or cognitive stage, the intermediate or associative phase and the final or autonomous phase. In the early or cognitive stage the beginner tries to understand the task and what it demands, attending to cues, events and responses that will later go unnoticed. The intermediate or associate phase involves the learner using their old habits, developing and trying out new patterns, and gradually eliminating errors. During the final or autonomous stage, the component processes become increasingly autonomous and less directly subject to cognitive control, and an individual is able to carry out the skill whilst engaged in other perceptual and cognitive activities.

The models of Dreyfus and Dreyfus (1986) and Benner (1984) have five stages of skill acquisition and it is argued that to attain expertise the individual must progress through each stage beginning as a novice. Dreyfus and Dreyfus define a novice as someone who has no experience of the situation in which they are expected to perform; therefore the novice demonstrates rule governed behaviour deconstructing the task into context free features. The next stage is the advanced beginner, where the individual is more experienced and able to identify meaningful aspects of the situation. The advanced beginner has a limited understanding of the situation but is experienced enough to identify meaningful aspects, and although the individual has developed, their actions are still determined by applying rules, while the context and application of these rules is developing. The third stage is that of the competent, where the individual can now see goals and in terms of the broader context and longer-range plans, weighting priorities. The competent individual will retain a memory of the situation as a whole, rather than break it down into individual elements as there are no particular salient features and instead they are all interrelated. The fourth stage is the proficient stage, where the learner perceives situations as a whole with their performance guided by maxims; they are able to identify when the situation is not normal, and holistically understand needing to actively make decisions, but they are not yet automatic. The final stage is that of expert, where the individual has accumulated and learnt from an enormous amount of experience, no longer relying on analytic principles to connect understanding to the situation, and are often described as having an 'intuitive' grasp. The expert is often not able to articulate their decision making due to this intuitive understanding and grasp of the situation.

Hoffman's (1996) six stages of proficiency present a continuum of development based on the craft guilds of the Middle Ages. The initial stage is that of the naviette, a person totally ignorant of the domain, with the novice being someone who has had some exposure to the domain. The third stage is the apprentice, where a student undergoes a programme of instruction beyond the introductory level provided to the novice. The journeyman has served their apprenticeship and now is able to work unsupervised although under orders, demonstrating a level of competence. The expert has special skills or knowledge derived from extensive experience within sub-domains and is able to make uncommonly accurate and reliable decisions demonstrating consummate skill and economy of effort; the expert can deal with rare or 'tough' cases. The final stage is that of the master, an expert who is qualified to teach those of a lower level and a member of the elite whose judgements set regulations, other experts may also hold in regard their standards or ideas and consider them the experts' expert.

Table 1: Comparison of the three models of expertise development
Taken from Fitts and Posner (1967), Dreyfus and Dreyfus (1986) and Hoffman (1996)

Fitts and Posner; The three stages of skills acquisition (1967)	**Dreyfus and Dreyfus; Model of skills acquisition (1986)**	**Hoffman; The six stages of proficiency (1996)**
Not comparable to Hoffman	*Not comparable to Hoffman*	**Naviette** Totally ignorant of the domain
Early or cognitive stage Progresses due to experience. Rule driven, attending to cues, events and responses.	**Novice** No experience of the situation in which they are expected to perform and therefore apply rule governed behaviour.	**Novice** Some minimal exposure to the domain
Intermediate or associative phase Old habits learnt are tried out and new patterns emerge. Errors gradually eliminated.	**Advanced beginner** Experienced enough to manage real life experiences and identify the meaningful aspects of the situation.	**Apprentice** A student undergoing a programme of instruction beyond the introductory level
Final or autonomous phase Component processes become increasingly autonomous and less directly subject to cognitive control. Speed and efficiency increases and improvement slows.	**Competent** Sees goals in terms of long-range plans or goals which shows weighing priorities.	**Journeyman** Can work unsupervised although under orders. Experienced and reliable worker whom has achieved a level of competence.
	Proficient Perceives situations as a whole with performance guided by maxims. Able to identify when situation is not normal and holistic in understanding and promoted decision making.	*Subsumed within journeyman*
Not comparable to Hoffman or Dreyfus and Dreyfus, subsumed within the final or autonomous phase.	**Expert** No longer relies on analytic principle to connect understanding to the situation, often described as having 'intuitive' grasp.	**Expert** Judgements uncommonly accurate and reliable; performance shows consummate skill and economy of effort. They can deal efficiently with rare or 'tough' cases. They have special skills or knowledge derived from extensive experience within sub-domains.
	Not comparable to Hoffman	**Master** Journeyman or expert who is qualified to teach those of a lower level. Member of elite whose judgements set regulations, standards or ideals. May be regarded by other experts as being 'the expert'.

A summary of the models is presented in Table 1 and shows the areas of alignment and divergence between the three. The differences may be due to the context in which they are presented within the authors work: Fitts and Posner, and Dreyfus and Dreyfus, considered those already on the journey to the development of skills, whilst Hoffman's model is based on historical development. Each model offers an opportunity to consider at each stage of the journey the characteristics that may be assigned to a person at that level, or what they may seek to become. Drawing on all three allows for the identification of differences and five areas of concordance.

1. The development of expertise demands time
2. There are stages that an individual must go through to develop skills and experience, which includes how to learn from those experiences
3. Those with less experience are more rule governed than those with more experience
4. Expertise is situation and context dependent
5. Schema must have been developed and the ability to use these in meaningful ways achieved

One area for agreement within the literature is that with active experience, the skills associated with nursing and providing nursing care as a registered nurse are learnt, and increase over time. In the UK, the programme leading to registration as a nurse demands successful completion of a minimum of a three-year degree programme (NMC, 2010). During this time the individual learns how to nurse and what this means, the physical skills, and the thinking and decision-making processes. It is therefore sensible to agree with the proposition that the nursing gaze, as a representative of embedded and tacit knowledge, will also develop and become refined. With education, training, practice and reflection, the nursing gaze is developed; therefore, the supposition is that as the individual develops their knowledge and ability their gaze will develop and sharpen, moving the individual from the novice to the experienced, and may be expert nurse. Identifying the characteristics of the expert's gaze will allow for the benchmarking of this skill and enable the expert to articulate their 'nursing'. Thereby augmenting the defining of nurses and nursing.

One of the commonalities within the literature is that gaze is learnt and develops over time as the nurse becomes socialised within the profession and develops the associated skills, knowledge and understanding. It is therefore a realistic assumption that these characteristics will be most evident in the more experienced nurse, who may find it difficult to articulate. To determine what these are, an understanding of how experience and expertise is developed and the associated characteristics is required. Drawing on this body of work should support the identification of the

gaze, in comparison to those who have not developed their nursing gaze, who in this instance are defined as novices.

Benner's (1984) seminal work regarding skill and knowledge development in nursing is much quoted and considered within the literature, and it provides a sound foundation on which to consider development in nursing. Based on Dreyfus and Dreyfus' (1986) five stage model of skill acquisition, Benner described five broad theoretical categories of knowledge and skill development: novice, advanced beginner, competent, proficient and expert. Benner purports that to move through these stages demands active learning through experience, and it is not just the 'knowing how' but the 'knowing that' which is the important tenet in the development of nursing skill. With each stage illustrated with exemplars gained from interviews and explored using an interpretive approach informed by the work of Heidegger, Benner demonstrated how nurses move through the stages, gaining skills and knowledge, and the importance of experience. Benner concluded that understanding and exploiting the knowledge of experts was important for development of others through the transfer of wisdom and judgement (Benner, 1984). In order to develop nurses we must therefore understand what nurses know, and this thesis draws on expertise as a key element in the understanding of the nursing gaze.

This thesis proposes that this tacit knowledge within the nursing gaze can be identified and explored as mediated through its discourse, as the experts' communicative ability is a key element in the determination of expert behaviour. However, when so much of the experts' knowledge is tacit and unspoken, methods are required for this to be uncovered and turned to text. In this way this thesis contributes to the development of nursing scholarship, considering what it is that nurses do and what nursing is.

1.5.2 Researching the Characteristics of Experts

An accurate definition of an expert must take account of both the characteristics and stages of development, and a working definition for this study has been developed from the literature, namely:

> ***A person whom through active experience has developed an extensive knowledge base within a specific field. Demonstrating the cognitive and perceptive where they no longer rely on analytical principles to connect and understand the situation.***

Understanding expertise allows for the possibilities of improving the efficiency of learning, supporting people to reach higher levels of attainment and perform at higher levels. It may also enable the development of environments that increase the proportion of those who reach the highest level (Benner, 1984; Ericsson, 2013). Therefore, understanding the structure and

development of expertise is an important step, as the attainment of expertise is not an automatic consequence of practice. Understanding expertise demands that expertise is defined through external criteria, such as level of skill or position within a profession/group, and importantly that these are recognised within that profession or group as the criteria indicating expertise (Hoffman et al., 1995; Ericsson, 2013).

Chi (2013) describes two broad approaches to the research of experts and expertise: firstly, by considering the expert in isolation to those of other levels of skills, and taking a retrospective approach to the level they have achieved or how they perform in certain high level tasks or an independent index; and secondly, to take a relative approach and compare to novices. Both approaches seek to elicit knowledge from the expert, and there are a variety of methodologies for the 'general purpose of revealing, representing, preserving, and disseminating expert knowledge' (Hoffman et al., 1995, p.130). Hoffman et al. (1995) place these into three categories: (1) analysis of the tasks experts perform; (2) various types of interviews; and (3) contrived techniques. These approaches and their associated methodologies have their proponents and critics, and can be combined with the approaches of Chi (2013) to describe knowledge. Determining which technique(s) are appropriate requires consideration of the task, the level of experience of the participants, and the overall aim.

Eye tracking and the capturing of verbal utterances (or protocols) have been successfully used to explore and identify the characteristics of developing experience and expertise. An interest in and access to technologies, such as eye tracking and videoed simulation, combined to lead to an early decision to employ eye tracking and verbal protocols as a method of exploring the nursing gaze. A review of the literature was designed and undertaken with the specific aim of exploring these methods within the context of the study.

1.5.3 Can the Concept of the Nursing Gaze be used to Educate Novice Nurses?

My current role as an educator focuses on the development of nurses at all levels, from the pre-registration student to the senior registered nurse, supporting them to gain skills, knowledge and ability. During my time in both clinical and academic practice I have seen students and nurses develop their skills through active experience, as well those who have failed to achieve. As a registered nurse working clinically, my primary focus was in critical care environments, fast paced and information rich, multifaceted places with patients whose needs were equally complex. This demanded a need to be able to identify and process useful information, whilst also recognising and storing away information for later use. I remember being faced with patients who I seemed to intuitively know would deteriorate, although there was no overt or obvious indication that this

would happen. When questioned could I have said why I felt this? I do not think I always could, it was the subtlety of the patient's condition and the information that only with experience could be interpreted. As a senior sister I learnt that the medical staff would listen to experienced nurses who had an intuitive feeling about a patient; experience had taught us all to trust our instincts and those of others we respected. After the event active reflection would sometimes produce an answer but not always, as there was often more than I was able to articulate, and this represents tacit knowledge or 'we know more than we can tell' Polyani (1996, p.4). As an educator I need to make the invisible visible and understand what the novice nurse needs in order to be able to support them in their own acquisition of this clinical knowledge.

1.6 Educating Nurses

When reflecting on my clinical practice, ideas began to form as to on the importance of nurse's 'vision' and what nurses actually see, or think they see, in developing their nursing practice. During a visit to a clinical area to see a student nurse, a registered nurse, who was acting as the student's mentor, summarised what she wanted of a final placement student nurse.

> *"I want to know that she can stand at the end of the bed and tell me what is wrong with the patient. You need to know what you are looking at, and make a judgement as they come down the corridor or you approach the bed as you might not have any longer than that to act."*

The nurse was confirming what I also thought, and I found myself doing this as a patient entered the ward where we were standing. The mentor continued saying:

> *"Sometimes you know that the patient is unwell but you don't always know quite why. Most of the time you are proved right and when you look back you can sometimes make sense of what you see but not always. It's the nurses own early warning system"*

But what is it that the nurse is doing here? How are they gathering the datum and what is it? How are they interpreting it? How are they using it? What does this mean for understanding nursing? These questions signalled the beginning of the journey that is represented in this thesis.

Consequently, I began to examine my own practice, what I considered to be the key elements of nursing. I kept coming back to the question: 'what is it that I actually see when I look at a patient'? Nightingale, writing in 1860, stated 'the most important practical lesson that can be given to nurses is to teach them what to observe…' (Nightingale, 1969, p.58). So how may vision and what nurses look at and see be used to further our understanding of nursing competence and be employed to teach others to develop their own? But what do nurses look at when they observe patients? What governs their cognition and perception of what they are seeing? Exploring these questions are the key tenet of this thesis.

As an educator I draw on my own clinical experience to support the development of others, but as an expert and experienced nurse and educator, how do I ensure that the student is able to grasp and understand the complexities of nursing? This has always been in my thoughts after being introduced to simulated practice early in my educational role, and it has become a staple of my educational offering. Whilst this thesis is not concerned with the use of simulated practice and its educational value, it is important to present simulated practice and its use within the case site as it is employed within this study as an enabler of acquiring and developing the nursing gaze.

Simulated practice involves the immersion of students in a clinical situation that mirrors clinical practice, but rather than real-life patients, it consists of mannequins or actors as patients and a set scenario. Simulated practice is often described as 'not real', and by its nature it is simulated and therefore the experience will be different to that of the 'real world'; however, as a learning experience it has proven valuable (Kohn et al., 2000; Cant and Cooper, 2009; Martins et al., 2016). Learning is achieved through the student's interaction during the scenario and afterwards via an in-depth facilitated de-briefing, where the experienced educationalist can support the student in developing their analytical skills, moving them through the levels of skills acquisition (Dieckmann et al., 2017). This controlled environment allows students to make mistakes and explore their own knowledge in relation to the patients they are engaging with in a safe manner. The way in which simulated practice is used with the case site is focused on the development of skills across the experience continuum. It is employed in pre-registration nursing to support those at the beginning of their programme to have some experience of practical skills, such as taking patient observations, through to qualified nurses working in critical care environments. Each aviation is designed to meet specific needs, and they are often used to expose participants to situations that are complex, difficult or rare. In this way the participant is permitted to enter a world in a safe way and develop their knowledge and experience with the support of others (Benner, 1999; Bambini et al., 2009; Bliss and Aitken, 2018).

At the study site[1], facilities are in place to record these simulated practice sessions thereby offering the opportunity for students to revisit their own practice as an aid for reflection, and in some cases (with appropriate ethical permission) to be used within research projects. As part of my education role engaging in simulated practice sessions I see students standing and looking at the patient or the wider scene. What is it that they are seeing and acting on what they see? Do their perceptions differ from mine? During the de-brief I will often ask them to take me back to when they were stood looking at the patient or the scene and ask them to tell me what they were thinking. These can be difficult questions as the students may not have the words to articulate

[1] To ensure participants confidentiality, the University or study site is not named in the main body of the thesis

this or the knowledge to understand what they have been looking at. Two people looking at the same patient may see different things or the same but have different interpretations, yet which is right? Or are they both right? How do we, as educators, know what the student is looking at and how they are interpreting it and using that knowledge? This thesis therefore proposes that the nursing gaze is a concept that can be identified and understand as a contribution to nursing scholarship used to inform the development of nurses.

A challenge that remains is how to identify the gaze, its parts and the sum that includes both explicit and implicit or unconscious element that may be difficult for the holder of the gaze to articulate. This thesis aims to turn the gaze onto itself, and by doing so turn it into something that can be handled, seen and explored.

1.7 Time to Address the Problem

At the outset of this study a wide range of literature was read to gather ideas and develop an understanding of the available literature. In 1984, when Benner was publishing her work, the methods available were limited to the technology of the time, but with subsequent developments other options to explore the development of skill and the nursing gaze have become available. The initial starting point was to consider what I believed the actual problem was and then how it could be addressed. Reading the literature, which has been drawn on throughout this study and is presented in the following chapter, led to four of questions

1. What has been written about the nursing gaze?
2. How has the gaze as a concept been explored before?
    a. What approaches have been used?
    b. What tools and techniques may support the exploration of the gaze?

The gaze is not overt and therefore requires techniques that would allow for the invisible to become visible. But the gaze is not just invisible, it is silent and in the silence enables the clinician to listen and “to hear a language as soon as it perceives a spectacle”(Foucault, 1989 p132). Therefore the techniques need to not only see the invisible but also hear the silence. Reviewing the literature suggested that there were a number of ways of addressing the problem; taking what is silent and invisible and Davenport (2000) was a participant observing how medical students learnt to see at a free clinic for the homeless. Riley and Manias (2002) used photographs as snap-shots of live theatre to explore the governance of operating rooms, Carlsson et al. (2002) developed re-enactment interviews, and Ellesfen et al. (2007) used observation, interviews and patients’ charts in a clinical fieldwork approach. These studies all drew on well-established

ethnographic techniques to achieve their aims, but with the development and emergence of technologies other methods are now available.

As vision and seeing is core to the nursing gaze, a logical step was to explore how 'seeing' may be captured. Familiarity with the technique of capturing visual attention through the use of tracking eye movement and the availability of this technology meant that an early decision to employ this was made. Since beginning this study there have been developments in eye tracking software and hardware and this is addressed in Chapter 8 were plans for the future are discussed. It is important to make this point now as this influenced decisions made at the start of the study. It is therefore timely to explore eye movement as an indicator of the viewer's attention.

1.7.1 Eye Movement as an Indicator of Visual Attention

Eye tracking is a technique that aims to identify cognitive processes through the measurement of eye movement by inferring what the individual is directing their attention towards (Duchowski, 2007; Homqvist et al., 2011). An important belief accepted in eye tracking research is that attention is linked to foveal gaze direction (Duchowski, 2007; Homqvist et al., 2011), and the movement of the eyes are unconscious adjustments to the demands of attention during visual experiences, uniquely poised between perception and cognition, and central to the function of the visual system (Buswell, 1935). Eye movement is therefore conscious and unconscious adjustment to bring the area of interest into the best place for it to be seen (foveal attention) in an active way (Findlay and Gilchrist, 2003). Henderson and Hollingworth (2001) offer three reasons to understand eye movement:

1. When studying perception and cognition, acquiring, representing and storing information about the visual environment is critical
2. The manner in which eye movements are controlled to service information acquisition offers insight into the efficient and timely acquisition of visual information during complex visual-cognitive tasks
3. Eye movement data can provide an unobtrusive measure of visual and cognitive information processing

Eye tracking has traditionally been used to explore vision and seeing in other fields where vision is an incorporating component of understanding practice and practices (Findlay and Gilchrist, 2009; Rose, 2012). It has been successfully employed within a number of fields, such as aviation, reading, chess playing, radiograph interpretation, and driving, in order to explore the perceptive and cognitive domains concerned with vision (Ottai et al., 1999; Reingold et al., 2005; Law et al., 2004; Eivazi et al., 2012; Li et al., 2012; Ooms et al., 2012).

Modern technology allows for the accurate tracking of the foveal reflection but does not necessarily provide insight into what the viewer was thinking when viewing. It may be that they find something interesting or difficult to interpret and therefore spend a lot of time focused on one area, or that they are pondering and happen to be focused on a particular part of the scene (Ericsson and Simon, 1993; Duchowski, 2007; Hyrskykari et al., 2008; Homqvist et al., 2011). Cooper (1974) identified three main visual types of behaviour:

1. Visual-aural interaction mode in which fixation of targets correlates with the meaning of the concurrently heard language
2. Free scanning mode in which the subject continually alters their direction of gaze in a manner independent of the meaning of the concurrently heard language
3. Point-fixation mode, in which the subject continues to fixate on the same location independent of the meaning of the concurrently heard language

To explore the viewer's perception requires additional consideration of how what the viewer sees is understood and interpreted. This may be through the completion of a task, and capturing verbal data during the viewing or afterwards (Findlay and Gilchrist, 2003; Bojko, 2013; Pink et al., 2016).

1.7.2 Capturing and Analysing Verbal Data

Relying on eye movement alone may not capture the perceptive aspect and the interpretation that the viewer is applying to what they see. One way in which to consider and capture the viewer's perception is to gather the viewer's thoughts by asking them to think aloud whilst watching (Charters, 2003; Bojko, 2013). Such techniques have been used within various studies allowing the researcher more insight into the viewer's attention, and enabling an exploration of what the viewer found interesting or important and why (Ericsson and Simon, 1993; Bojko, 2005; Homqvist et al., 2011). Within the literature there is no consensus as to the timing of verbal data, either during or after the task, and an exploration of the wider literature identified a variety of techniques but with two main approaches: (1) concurrent thinking aloud; and (2) retrospective thinking aloud, which may be cued by the viewer's own eye movement.

There is debate within the literature as to which technique provides the greatest insight into the viewer's perceptive processes, and both approaches have advantages and disadvantages (Charters, 2003; van Den Haak et al., 2003; Alshammari et al., 2015). Bojko (2013) suggests that concurrent thinking aloud is useful for usability tests, whereas retrospective thinking aloud allows for a more accurate representation of the eye movement during the task, as verbalising thoughts may interfere with the task. However, Bojko (2013) does not appear to take into account the

change that will have occurred in the viewer having already seen the stimulus and undertaken the task. Whilst concurrent thinking aloud may interfere and slow a viewer down, it does allow for utterances that are not influenced by the whole process. For instance, if a viewer is watching a video of a footballer player taking a penalty shot at goal, the video includes two players, the shooter and the goal keeper, whereby the shot at goal is not successful as the goalkeeper catches it. Watching this video for the first time the viewer may have an idea about the outcome but does not know what happened, but as soon as they know the outcome it is arguable and probable, that they will then apply this knowledge to the situation. Whereas before they may have felt that the player was going to be successful, they now know that this was not the case and alter their thinking, and this post-hoc rationality changes the information forever (Polanyi, 1966; Martinez, 1992). This may be a useful technique in some usability testing, as it may be that knowing the outcome aids the viewer in making sense of what they were looking at but it is dependent on the task they were given and the aim of the study. With both approaches careful consideration is needed regarding the stimulus, the task given to the viewer, and the manner in which the analysis will be approached, to ensure that the conclusions are valid and truthful (Bojko, 2013; Alshammari et al., 2015). Drawing on other techniques, such as interviews post-watching allows for the viewer to expand on points and the interviewer to gather greater insight. Whilst there is still a potential for recall bias and the viewer saying what they feel the interviewer wants to here, this does however offer support to the reliability of the analysis.

1.7.2.1 Combining the Data

To explore the nursing gaze both the cognitive and perceptive elements require consideration and elicitation. Combining the data gathered by different methods allows for the triangulation of results and increased validity (Christensen, 2007; Bekhet and Zauszniewski, 2012; Cowan, 2017). Drawing on different sources to gather data and subsequently analysis supports the interpretation of one set of data to judge the meaning of another. Rather than rely on eye movement alone, the use of verbal protocols assists in the identification of what the viewer found to be of interest, rather than solely what they looked at, which is an important element of understanding both cognition and perception. In 1974 Cooper introduced the theory of auditory language processing, and concluded that when viewers are simultaneously presented with a verbal soundtrack and a visual field containing elements semantically related to the informative items of the soundtrack, then they tend to direct their attention to that which is most closely related to the meaning of the language they are hearing. Without such verbal protocols the eye movement may tell an incomplete story.

With the decision made as to how to capture the nursing gaze, the focus turned to the object of the gaze. Familiarity with simulated nursing practice and the availability of videos on this led to the belief that this would be an appropriate object for the viewer to see, and which would elicit the nursing gaze. A video of simulated nursing practice has both audio and visual tracks that are intertwined and directly capture the action. A reasonable assumption is therefore the eye movement of the viewer would be directed to areas of interest, whether consciously or unconsciously, and that the capture of this would lead to a visual representation of the nursing gaze.

1.8 Research Question and Aims

This study began with a critical reflection on my own practice as both a nurse and an educator. Familiarity with some of the literature concerning Foucault's philosophy and the technologies that were available were combined to start this journey, leading to three simple questions:

1. What is the nursing gaze?
2. What do nurses look at when they see a patient?
3. What do they recognise, what do they describe and how when they look and see?

Through consideration of the literature, my own experience, and much discussion with others, these evolved to become the research question of this study, namely:

Can the cognitive and perceptive elements of the nursing gaze be articulated through the comparison of novice and expert nurse's eye movement and verbal utterances through the watching of a video of simulated practice?

This question recognises the complexities of the gaze and the methods that would be needed to answer it, and led to the development of six aims that structure and guide this study:

1. Identify methods of data capture which will facilitate identification of the nursing gaze through an analysis of the spoken and unspoken
2. Identify methods of data analysis which will facilitate identification of the nursing gaze
3. Test the identified methods of data capture to facilitate identification of the nursing gaze through an analysis of the spoken and unspoken
4. Test the identified methods of data analysis to facilitate identification of the nursing gaze
5. Assess the validity of the methods of data collection as methods of capturing the nursing gaze through a comparison of the findings from each data set

6. Identify characteristics associated with the nursing gaze of those with differing levels of experience from which conclusions can be drawn

The aims of this study are to explore and understand the nursing gaze, and therefore this definition is revisited and refined. Exploring the gaze and turning it inwards to make it self-reflective, Manis and Street (2000) support the reclaiming of the nursing gaze as re-humanising (a term first employed by Sharpiro in 2000), questioning its unconscious application and allowing for the reintroduction of forms of looking that promote patient (and nurse) well-being (Shapiro, 2000, p.168). Identifying and understanding the gaze enables a deeper understanding of the development of experience and expertise, providing insight and opportunities to accelerate learning or to contribute to the development of expert systems (Webster-Wright, 2009; Goldman and Pellegrino, 2015). As Haraway states, by thinking carefully about where we see from 'we might become answerable for what we learn how to see' (1991, p.190).

1.9 Structure of the Thesis

Having identified the key concepts that underpin this study it is important to turn to the remainder of the thesis and how it is laid out. At the beginning of the study it was evident that to truly explore the research question a methodology that allowed multiple voices and perspectives was required. With the complexities of the nursing gaze and visual assessment identified it was clear that a new and innovative method, drawing on both quantitative and qualitative approaches would be required. This thesis is therefore designed to provide a logical journey that takes the reader through the underpinning literature in order to set the scene in this first chapter, before moving in the next chapter to the background literature that provides the theoretical foundation on which to proceed. Chapter three turns to the methodological considerations to create a conceptual framework of the nursing gaze, which enabled a two-phase experimental study to be designed that recognised multiple voices and drew on post-structuralist thinking to create methods for analysing the data. In Chapter 4 these analysis methods are tested and refined, culminating in the development and naming of a methodology: 'Gaze-to-text'. The analysis of data from phase one is presented in Chapter five, before turning to the development of a one-armed experiment in Chapter six, which is formally outlined with methods and tools which are considered with respect to validity, reliability and success in achieving the aim of further developing the concept of the nursing gaze. Chapter seven presents the results and findings from this experiment, and finally Chapter eight discusses these findings in the context of the literature and summarises the conclusions that can be drawn from this work, the novel contributions to the body of knowledge on the scholarship of nursing and beyond, before making recommendations for continuing research.

1.10 Chapter Conclusion

Drawing on the limited literature concerning the nursing gaze, this chapter has presented the theoretical standing on which to proceed, and has identified vision as a key aspect of nursing practice that is exploited to develop a greater understanding of nurses and nursing practice. With vision and visual assessment identified as the vehicle to developing the concept of the nursing gaze, the chapter turned to methods that would expose the cognitive and perceptive elements of visual assessment and the gaze. Chapter 2 develops this further through a review of the relevant literature concerned with the tools identified in this chapter as providing opportunities to identify the nursing gaze.

Chapter 2 - Review of the Literature

2.1 Introduction

In order to proceed, a comprehensive review of the literature was required in order to: (1) determine what is already known; (2) consider the possible methodological problems and solutions may be; (3) provide the context to the study; and finally (4) whether the topic is worth pursuing (Christensen, 2007). A literature review was undertaken to inform the burgeoning ideas and the development of this study.

The literature outlined in the previous chapter acts as the theoretical foundation on which to base a review of the relevant literature. This chapter builds on this and presents a systematic search of the literature in order to further: (1) search for the tools that may be able to support the articulation of the nursing gaze; and (2) offer ideas for developing these tools supporting the development of the conceptual framework in the following chapter and the subsequent experiment.

2.2 Review of the Methodological Literature Concerned with Eye Tracking and Verbal Utterances

During 2012/13, a number of information and scoping searches were undertaken to gain insight into what literature would be useful in this study. This approach permitted consideration of the literature from a number of fields and a narrowing of the search terms to ensure that the systematic search identified all relevant literature. This resulted in identifying the traditional methods of observing nursing practice (ethnographic techniques, quantitative analyses of outcome, and text analyses), as well as the use of eye movement that was developing its own methodology. Concurrently, research regarding expertise and its development and the nursing gaze were also considered, as key concepts in the burgeoning ideas for the study.

The first stage of reviewing the literature was concerned with the identification of key concepts, terms and their interplay, which would guide the search of the literature (Table 2). A thorough search of the literature was conducted initially in 2012 and then repeated in January 2015, January 2016, and again finally in January 2017. In addition, to ensure that any new relevant literature was included, alerts were set on each of the databases used and reviewed monthly. The following review is presented in two parts; the first is the results of the systematic search conducted in 2015, as this superseded and included the papers found in the previous searches,

and the second is a final search made of the literature that replicated the previous but included the word 'nurse', as discussed in section 2.4.

What is presented here is the culmination of the review of the specific literature with the aim of informing the design of this study. This search of the literature was designed to further the exploration of the methods that may be used to explore the research question, building on the previous discussions. In order to achieve this, key words were identified and used in appropriate databases to identify relevant articles. A familiarity with the literature regarding eye tracking was used to inform the development of the search, and whilst these papers are not specifically included in the final review of the literature, they have informed the review of the literature and the study design.

2.2.1 Database Searches

An initial broad search of the literature in DelphiS and Google Scholar using the terms 'nurse + gaze + eye tracking' resulted in over 16,000 results being identified and proved useful in adapting the search terms to ensure that the best results were found. The key words and phrases shown in Table 2 were developed from this initial search with support from the author's University librarian team. Boolean operators were used to facilitate the identification of results by recognising that there are different terms with the same meaning.

Table 2: Key words used in the systematic search of the literature focusing on studies using eye tracking comparing novice and experts with dynamic stimuli

Key word/phrase	Justification
Novice and or expert Nurs*	The study is looking at comparison between the two in order to explore characteristics and elements of the nursing gaze.
Eye tracking and or eye movement or gaze	The focus on this search was the use of tools and therefore eye tracking is used with the synonym eye movement.
Dynamic and or film and or movie and or video	Nursing consists of viewing and interacting with dynamic scenes and the literature suggests that there are different techniques and strategies involved when viewing dynamic as opposed to static images or simulated or live tasks

The results were limited to those reporting primary research and available in English, while no date limit was set to allow for the greatest amount of literature to be identified at this point. Papers were excluded if they did not use adults as the study population, used eye tracking as a method for detecting conditions of the viewer (i.e. dyslexia, schizophrenia, etc.) or the stimulus being viewed was static. Further consideration of the elements of the task that form the main element of this study (i.e. the use of video as stimulus). Evidence suggests that the task and stimulus had an effect on eye movement regardless of the level of experience (Zelinsky and

Neider, 2008; Dorr et al., 2010; Kurzhal et al., 2014). This led to a more focused search, and it was decided that unless the stimulus in the research was dynamic in nature (film, movie and not a static image) then it would not be included. Tasks with a complex, dynamic visual component require not only the acquisition of conceptual/procedural skills but also perceptual/attentional skills (Jarodzka et al., 2010). This meant that papers where the stimulus involved the participant having any physical movement or involvement were excluded. Examples included simulations in aviation or marine navigation, web navigation, problem solving using pen and paper, etc. All papers included in the final critique needed to be concerned with:

- A dynamic task that the viewer/participant has no control over(visual patient assessment is a dynamic task but to ensure that the stimulus is the same for all participants' in an experimental setting)
- A task that must have a purpose in decision making rather than just information gathering or problem solving (purpose of visual assessment is a 'diagnosis')
- Different levels of experience are included and compared (to allow for comparison between levels of skill)

During this search a meta-analysis of eye tracking research in professional domains by Gegenfurtner et al. (2011) was found. This was used to crosscheck the findings of the systematic search conducted, to look for any further relevant articles that met the inclusion criteria for this study. Ten papers were identified that had already been found and a further three were identified; however, after reading the abstracts they were not included in the final critique as they did not meet the final inclusion criteria. These papers were read in their entirety as they provided background and facilitated a deeper understanding of the theory and application of relevant methods and theories. The databases searched were identified as being relevant to the subject and are discussed in turn.

2.2.1.1 DelphiS

DelphiS is a single interface that searches electronic and print items held by or available to the author's University. It does not effectively search the databases below and therefore separate searches were undertaken. DelphiS was searched using the keywords shown in Table 2 using no further limiters. Initially, each keyword was searched individually before being combined. Whilst this is not a sophisticated approach to searching the literature, the novel technology and the manner in which it was to be considered required that broad approach to ensure that all relevant work was captured. As can be seen in figure 2, 29 papers were identified using this approach and three met the final inclusion criteria.

2.2.1.2 Engineering Village

Engineering village provided access to engineering literature databases and was a recommended database to search for eye tracking. This database allows for the use of 'autostemming', whereby it identifies the root of any search word and retrieves not only what is entered but also related terms. This function was left on to facilitate searching and provided the most amount of hits at 129. The abstracts of each were read, and then 25 papers were read in full before 21 were then excluded as the task involved live action or simulation (16 papers) or were concerned with using eye movement to teach others (5 papers). This left four papers that meet the final inclusion criteria.

2.2.1.3 Scopus

Scopus is a database of peer-reviewed literature from science, technology, medicine, social sciences, arts and humanities. The keywords in Table 2 were again used to search this database which yielded six hits; all were read but five were duplicates (two were already identified in DelphiS and one in Engineering Village), with one moving forward to the final critique.

2.2.1.4 Association for Computing Machinery (ACM)

ACM is a digital library that is a research, discovery and networking platform, reported to be the largest in the education and scientific society. The keywords in Table 2 were again used and this resulted in 28 hits all of which were read. Ten were initially considered as relevant, but on further reading nine were excluded as four considered involved tasks where the viewer had control over what they saw and three were poster presentations that did not contain detail. The authors of all three posters were contacted by e-mail using the contact details available and one responded to say the study had stopped and no further data or information was available, while the other two authors did not respond. This left no papers identified as fulfilling all the inclusion criteria.

2.2.1.5 Institute for Electrical and Electronics Engineers

The Institute for Electrical and Electronics Engineers (IEE) is a technical professional society who reports that it publishes nearly a third of the world's technical literature in electrical, engineering, computer sciences and electronics. Using the keywords of 'eye tracking' or 'gaze' resulted in 2560 hits, but when combined with the other search terms from Table 2 no results were found. The search using eye tracking or gaze and expert or novice resulted in four hits but on reading all were excluded, as they did not meet the final criteria; three were concerned with proposing a new data analysis and one did not compare novice to expert.

2.2.1.6 Journal of Eye Movement Research

A direct search of the Journal of Eye Movement Research was also conducted, as this was not included in any of the above databases. This journal proved to be useful in developing the underpinning knowledge required to successfully employ eye tracking. One paper was initially found to be relevant, however on further reading it was discounted, as it did not fulfil all the final inclusion criteria with the task consisting of active involvement by the viewer.

2.2.1.7 Google Scholar

A search of Google Scholar was also carried out using the same key words to ensure that all relevant papers had been identified. The top 100 hits were viewed and as no new papers were identified the search was stopped.

A diagrammatic representation of the search and final papers is shown in Figure 2.

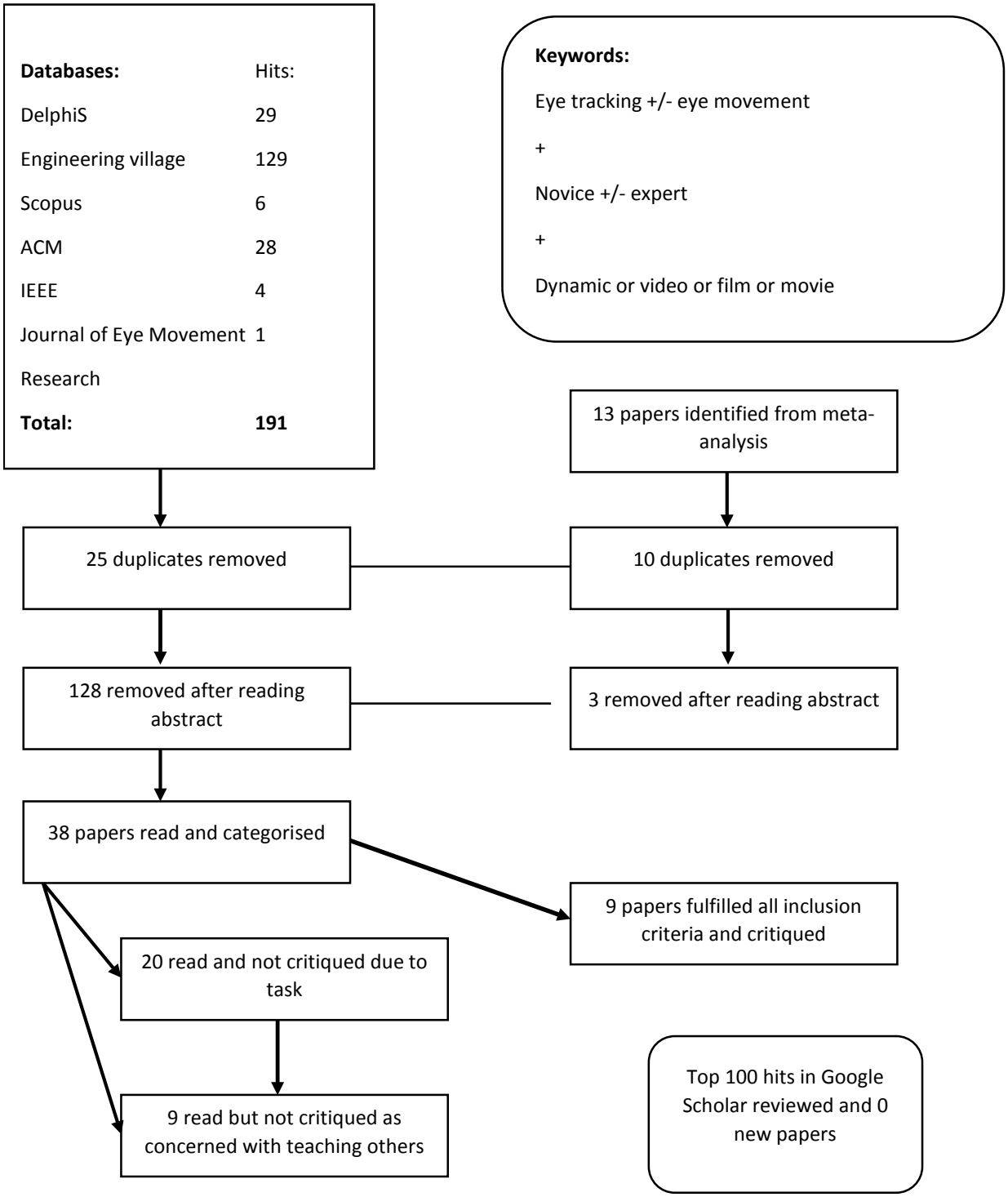


Figure 2: Diagrammatic representation of the main literature search

2.3 Dynamic Stimulus Comparing the Novice and Expert

To facilitate critical thought all the papers were read and information pertaining to domain, task characteristics, methods and results, were entered into a table, the headings of which were informed by a meta-analysis of eye tracking research in professional domains conducted by Gegenfurtner et al. (2011). This facilitated the extraction of the data and the extrapolation of conclusions that were subsequently used to inform the study design. The complete table is presented in Appendix A, with an example for one included paper shown in Table 3.

Table 3: Example of table used to tabulate the nine studies identified in the systematic review of the literature

Dynamic stimulus with associated task (Viewing, detection, decision, problem-solving, diagnosis, prediction of outcome, description)			
Domain and focus	**Method, design and task**	**Data analysis**	**Results and conclusions**
Balsev, T., Jarodzka, H., Holmqvist, K., de Grave, W., Muijitjens, A., Eika B., van Merrienboer, J., Scherpbier A. (2012) Visual expertise in paediatric neurology. *European Journal of Paediatric Neurology,* 16*,* 161-166			
Paediatric neurology – accurate diagnosis of seizures	Diagnosis of possible condition All watched all videos with concurrent think aloud 4 videos with the Area Of Interest (AOI) determined by experts **Population/ sample** 15 medical students 16 residents 12 experts	<u>Dependent</u> Diagnostic accuracy Time on task Time looking at Areas Of Interest (AOI's) <u>Independent</u> Level of expertise **Analysis** Verbal data coded at 3 levels; Data exploration Theory building Theory evaluation	More experienced explored less data and built and evaluated more theories than the less experienced. More experienced clinician's process visual data more effectively. Concomitant perceptive and cognitive data reveals how more experienced clinicians compare to less experienced clinicians.

Nine papers were identified during the search of the literature that fulfilled all of the criteria set, and a summary is shown in Table 4. Consideration was given to the domain, task, method, analysis and conclusions from each of the papers and a synthesis of the findings follows.

Table 4: Summary of the nine papers identified through the systematic review

Domain and focus	Method, design and task	Data analysis	Results and conclusions
Balsev, T., Jarodzka, H., Holmqvist, K., de Grave, W., Muijitjens, A., Eika, B., van Merrienboer, J., Scherpbier, A. (2012) Visual expertise in paediatric neurology. *European Journal of Paediatric Neurology,* 16, 161-166.			
Paediatric neurology – accurate diagnosis of seizures	Diagnosis of possible condition All watched all videos with concurrent think aloud 4 videos with areas of interest (AOIs) determined by experts 3 groups	Diagnostic accuracy and time on task	More experienced clinician's process visual data more effectively and use less data to build theory Concomitant perceptive and cognitive data reveals how more experienced clinicians compared to less experienced clinicians.
Betram, R., Helle, L., Kaakinen, J., Svedstrom, E. (2013) The effect of expertise on eye movement behaviour in medical image perception. *PLOS ONE,* 8(6), 1-15.			
Medical image	Diagnosis of possible condition 1 practice and 9 volumes of multi-stack CT's 3 groups	Diagnostic accuracy Fixations	Experts needed fewer fixations on relevant areas, detecting more abnormalities with shorter saccades
Crespi, S., Robino, C., Silva, O., de'Speratti (2012) Spotting expertise in the eye: Billiards knowledge as revealed by gaze shifts in a dynamic visual prediction. *Journal of Vision,* 12(11), 30 1-19.			
Billiards – predict final outcome and trajectory of ball	Prediction of outcome 48 videos (24 repeated for each) 5 within-subjects and 1 between subject ET and verbal response to question 3 groups	Accuracy and response time	Experts performed better in terms of accuracy and response time with narrower gaze and exploring less Similar saccades (could be explained by the nature of the task)
Francisco Javier M., Francisco, A., Raul, R., Vicente, L. (2006) Visual behaviour of tennis coaches in a court and video-based conditions. *International Journal of Sport Science,* 2(5), 29-41.			
Tennis coaches	Detection: performance error detection process 2 groups	Number of visual fixations Time of visual fixations	Experts had less visual fixations with some similarities in gaze pattern

Domain and focus	Method, design and task	Data analysis	Results and conclusions
Goulet, C., Bard, C., Fleury, M. (1989) Expertise differences in preparing to return a tennis serve: A visual processing approach. *Journal of Sport and Exercise Psychology,* 11, 1382-398.			
Tennis, serve of ball	Detection 2 groups	Correct answer Number of fixations on specific cue	Experts had higher number of correct responses with differences in the AOIs Experts use information differently and need less information and make quicker decisions
Jarodzka, H., Scheiter, K., Gerjects, P., van Gog, T. (2010) In the eyes of the beholder: How experts and novices interpret dynamic stimuli. *Learning and Instruction,* 146-154.			
Fish locomotion.	Description of locomotion Experiment with ET and concurrent think aloud Cued RTA Population/ sample 2 groups	Correctness of technical term Mean viewing time Distribution of gazes across AOIs	Experts; Were faster, More accurate, Consider more of relevant information earlier,
Khan, R., Tien, G., Atkins, S., Zheng, B., Paton, O., Meneghetti, A. (2012) Analysis of eye gaze: Do novice surgeons look at the same location as expert surgeons during a laparoscopic operation? Surgical Endoscopy, 26, 3536-3540.			
Laparoscopic surgery – video viewing	2 phase study - Identification of viewing points in live and replayed surgery 2 groups	Compared overlay of self-watching and watching others	Novices had eye gaze patterns that wandered from key areas, experts demonstrated closer eye-gaze patterns that focused on key target areas
Raab, M., Johnson, J. (2007) Expertise-Based Differences in Search and Option-Generation Strategies *Journal of Experimental Psychology: Applied* 13(3) 158-170			
Hand ball players	Decision making - tactical Longitudinal design 3 groups 3 groups	Perceptual memory recall test prior to videos After each clip, verbalised first option	Experts require fewer fixations (partial evidence) Gaze strategy had no effect on number of options generated but a spatial gaze strategy led to better initial generations and final choices
Shimizu, S., Kadogawa, T., Kikuchi, S., Hashizume, T. (2014) Quantative Analysis of Tennis Experts' Eye Movement Skill *Presented at ACMC2014 Yokohama, Japan March 14-16 2014*			
Tennis	Prediction of outcome – predict the placement of the shot 2 groups	**Analysis** Heat maps using gaze plots Single parametric model having a polar coordinate system	Beginner has a tendency to follow the ball unconsciously for a moment after ball was hit The more experienced the player the less they followed the ball after the shot

2.4 Themes from the Literature

The in-depth critique of each of the papers identified two themes related to (1) the methods; and (2) characteristics of the expert. These are presented in the following sections with explicit reference made to the papers.

2.4.1 Experimental Methodology

The nine papers all used experimental methodologies to identify and explore any differences in the characteristics of participants in relation to the study stimulus, with what Hoffman et al. (1995) would classify as a 'contrived technique'. All were designed to provide a stimulus for the knowledge elicitation of the participants by asking for a diagnosis or prediction of an event as an outcome measure in all, although in two papers eye movement alone was used as the only data (Francisco Javier et al., 2006; Shimizu et al., 2006). The sample size and sample selection varied amongst the studies but were all justified, using length of time in a position of employment or role as the criterion to determine the level of experience/expertise. Khan et al. (2012) had four experts in their study, two of whom could not be eye tracked, whilst Crespi et al. (2012) had 42. This variation is evident within all of the studies and must be taken into consideration when viewing the results.

2.4.1.1 Eye Tracking

There was commonality in the eye tracking measures with slight variation between measures of saccades and fixations. Statistical testing used both parametric and non-parametric tests to analyse the eye tracking data and draw conclusions. The eye tracking measures are shown in

along with the associated questions and purpose. There was variation in the definition of fixations (time spent without the eyes moving) and saccades (the movement between two fixations) with studies providing their own definitions. This is a well-known variable within the literature and as yet there is no consensus, with the researcher advised to determine their own (Duchowski, 2007). Within the studies the eye tracking measures were used as the dependent variable with the level of expertise and when appropriate ordering of task etc. was used. The studies consistently used the eye tracking measures as seen in Table 4 as the independent variables, employing within and between designs to analyse the data. The variability demonstrated here is consistent with the wider eye tracking literature illustrating the variety of potential tools of analysis.

Table 5: Eye tracking measures as reported in the literature

Data	Research questions asked	Papers
Fixations *Indicator of what the viewer considers of interest. The gaze staying on a particular area of interest (AOI) determines fixations.*	What is the area of the first fixation? How long to the first fixation? How long did the viewer spend on the first fixation? Where did the viewer next fixate? How long where subsequent fixations? How many total fixations where there?	Balsev et al. (2012) Betram et al. (2013) Crespi et al. (2012) Francisco Javier et al. (2006) Goodwin et al. (2013) Goulet et al. (1989) Harvey et al. (2014) Jarodzka et al. (2010) Khan et al. (2012) Shimizu et al. (2014) Underwood et al. (2002) Martell and Vickers (2004)
AOI *AOIs can be predefined to allow for statistical consideration of the viewer's gaze and fixation.* *Time spent on various AOIs is indicative of what the viewer found of interest.*	What was the time until the first fixation on an AOI? How many times did the viewer view each AOI? Did the viewer view and fixate on all AOIs? How long where the fixations on the AOIs? How much time of the total was taken viewing AOIs? In which order did the viewer attend to the AOIs? Were there any AOIs to the viewer that were not predetermined by the expert?	Balsev et al. (2012) Betram et al. (2013) Crespi et al. (2012) Francisco Javier et al. (2006) Goulet et al. (1989) Jarodzka et al. (2010) Khan et al. (2012) Raab and Johnson (2007) Shimizu et al. (2014)
Saccades *Saccades are the movement between AOIs. The saccades or movement between one or more AOIs can support the identification of theory building and testing.*	What was the mean length of saccades? Are there any patterns evident?	Betram et al (2013) Crespi et al (2012) Goodwin et al (2013) Goulet et al (1989) Harvey et al (2014) Khan et al (2012) Raab and Johnson (2007) Underwood et al (2002)

2.4.1.2 Verbal Data

The collection of verbal data is an established method to explore what the viewer looked at and how they made sense of what they looked at. There are a variety of methods reported within the wider literature that includes variations in how the data is collected, together with when and how it is analysed. Within the nine papers considered here, two did not collect verbal data from their participants, relying instead on eye movements to draw conclusions (Francisco Javier et al., 2006; Shimizu et al., 2014). The remaining seven papers collected verbal data from participants by asking them to talk through their thinking (think aloud) and answering knowledge based questions (diagnosis).

The studies by Balsev et al. (2012) and Jarodzka et al. (2010) employed a concurrent thinking aloud protocol to explore the cognitive element of the task they presented to their participants. Conclusions have been drawn in both of these studies about the usefulness of this approach and the findings have been strengthened by this inclusion. Both studies concluded that without exploring and understanding what the viewer/participant is looking at and why, it is arguably difficult to determine how they are using what they see, and whether what they look at is of use in the decision-making process. The studies that did not employ thinking aloud techniques relied on the outcome to determine and extrapolate the viewers' thinking and reasoning process, which may be considered open to debate with regards to reliability and validity.

Balslev et al. (2012) explored the differences between novices and experts in diagnosing epilepsy in children used concurrent thinking aloud with a similar method to that of Jarodzka et al. (2012), and these studies share authors. Through analysis of the verbal responses combined with the eye tracking data they concluded that the experts were more accurate in their diagnosis and spent longer considering appropriate theories.

Betram et al. (2013) asked participants to answer four questions after watching each video concerned with whether they saw enlarged lymph nodes and how they felt about the speed of the videos. Analysis of the answers with regards to whether they detected enlarged lymph nodes showed that the experts performed with more accuracy than those at lower levels. Raab and Johnson (2007) used eye movement as the independent verifier of decision strategies that were reported verbally, which were coded and categorised according to accuracy. Raab and Johnson concluded that combining verbal and eye tracking data allowed for the identification of decision strategies and accuracy, whilst also opening up additional considerations for the future. Crespi et al. (2012) reported verbal data where participants decided whether a billiard shot would be successful by answering yes/no. Accuracy and response times were analysed with conclusions drawn that experts within their sample did not perform as well as expected. The authors

suggested that this may be due to unfamiliarity with the task, which is a recognised factor (Ericsson and Williams, 2007). Goulet et al. (1989) also used accuracy as the variable in the analysis of the verbal data, concluding that experts were more accurate than novices.

The variety of methods used to explore the perceptive element of the task reflects the difference in tasks and appropriate knowledge elicitation. The most comprehensive verbal data was reported by Jarodzka et al. (2010) who used cued retrospective reporting. Here the participant was asked to verbally report their thinking during the task, watching their own their eye movement after the task. Jarodzka et al. (2010) concluded that experts were more accurate in their description, used less data and showed behaviours indicative of expert practice. They based these conclusions on the initial utterances, accuracy of description and attentional focus. Such a concurrent thinking aloud technique is debated within the literature, with questions being raised over whether this may be artificial to the viewer, therefore affecting their thinking and performance (Neilson et al., 2002; Elling et al., 2011). The viewer has already seen the stimulus and made judgements about what they have seen and how they have interpreted it, potentially offering the possibility of post hoc bias (van Gog et al., 2005; Richer et al., 2010; Elling et al., 2011; Gegenfurtner and Seppanen, 2013). However, there is agreement within the literature that verbal protocols as a principle allow for the thought processes of the viewer to be determined and explored (Lundgren-Laine and Salantera, 2010; Oh et al., 2013; Zhao et al., 2014).

It is clear from the literature reported here and the wider literature that the collection of verbal data contributes to the identification and exploration of how viewers use the information that they gain from viewing the stimulus. When this is combined with eye movement, stronger conclusions can be drawn about the viewer's cognitive and perceptive elements processes. What is clear is that the task is key to ensuring that the conclusions are valid.

2.4.2 Characteristics of the Expert

The evidence from the systematic review presented here strongly supports the supposition that there are key, observable characteristics associated with expertise. These are drawn from across a variety of domains, all of which demand both cognitive and perceptive abilities of the viewer.

The findings of Goulet et al. (1989) did not always align with those of the other studies and this may be due to the task given to the participants. Within the study participants were asked to watch tennis serves and predict the outcome; there are a number of variables involved here which may have impacted on the outcomes. A tennis serve is divided into stages (ritual, preparatory and execution) and both left and right-handed individuals delivered serves, and the complexities of this variable alter the stimulus and the viewer's frame of reference, which may

explain the findings. The findings of two other studies that included tennis serves, Schimuzu et al. (2014) and Francisco Javier et al. (2006) are more in line with the findings from the other studies and both contain less variables for analysis.

2.4.2.1 Predicting Eye Tracking and Verbal Data Associated with the Development of Experience

The review of the literature has allowed for a synthesis of the findings and their application to the nursing gaze. Drawing on the literature presented within this chapter and the previous chapter, predications can be made with regards to how the level of experience will show in the eye movement and verbal utterances, as shown in table 6 Here the eye movement and verbal utterances are shown mapped to the stages of skill acquisition according to Dreyfus and Dreyfus (1986) and Benner (1984). This hypothesis forms part of the foundation on which the subsequent phases of the study are based, as they offer an opportunity to draw out thinking and start to develop a model of the nursing gaze.

Within this model each stage of skill acquisition is considered in relation to how it may be seen in both the eye movement and verbal utterances of the individual. According to Dreyfus and Dreyfus (1986) and Benner (1984), each stage builds with the eye movement showing greater direction and consideration of areas of useful information. The verbal utterances develop through the model to reflect the move from rule orientated observations to a holistic summation, and here the gestalt is evident.

Table 6: Predictions of how the stages of skill development will be demonstrated through eye movement and verbal utterances

Stage **(Benner, 1984; Dreyfus and Dreyfus, 1986)**	**Predicted characteristics in eye movement**	**Predicted characteristics in verbal data**
Novice *Minimal exposure to the domain and role.*	The novice will start to pay attention to that which is novel to them. The novice will spend time on irrelevant areas with short saccades and fixations.	The novice will have some knowledge of what they are seeing and therefore will begin to use appropriate language. Due to the lack of knowledge these may be inappropriate or inaccurate. The utterances will be descriptive.
Advanced beginner *Experienced with real life experience which enables them to identify meaningful aspects of the situation.*	The advanced beginner will show more attention to areas relevant to the task. This will show with saccades moving in a more logical and algorithmic manner drawing on their education and training.	The advanced beginner will have a more developed language and the confidence to use it. They may use lay language or professional language in an inappropriate or accurate way when exposed to situations not seen before. They will bring what they know to bear on the situation.
Competent *Nurse at point of registration, experienced and reliable who is able to see long-term goals and able to weigh up priorities.*	The competent nurse spends less time on unimportant areas and increasing time on important areas, moving between them to confirm and deny. Their eye movement will demonstrate higher lengths of fixations and shorter time on task.	The competent nurse will have the professional language and use heuristic shortcuts to make judgements. They will be able to draw on experiences to make points and will demonstrate understanding of what they are seeing in the context of consequences.
Proficient *An experienced nurse whose performance is guided by maxims. They are able to identify when the situation is not normal.*	Their eye movement will show the shortcuts that they have developed based on experience. Time on areas of interest will increase and time on task reduces.	Increasing use of appropriate heuristics and shortcuts will be evident in their language. There will be evidence of holistic decision-making.
Expert *An experienced nurse who has moved beyond the proficient nurse and has developed expertise in their field. They no longer rely on analytic principle and often described as having an intuitive grasp.*	The expert will spend the highest proportion of their time on areas of relevance. There will be higher fixations and less saccades. There will be less time on task.	The expert will have the professional language to articulate their findings although they may have difficulty in verbally expressing their decision-making. Drawing on their experience and holistic decision-making they will demonstrate the intuitive grasp through their use of encompassing language.

2.5 A Final Search for Eye Tracking in the Nursing Literature

In January 2016 (and also in January 2017) the literature was searched again in an effort to identify any specific papers to nursing, as the initial searches had identified no papers that included nursing and eye tracking. The aim of this search was to find additional papers related to eye tracking as a method for exploring the visual attention of nurses. In 2015 three papers were noted via the alerts set up using the keywords in the databases as presented in section 2.2. Each of the databases was searched again with broad keywords, such as nursing (nurs* + eye tracking or eye movement). This resulted in the identification of ten papers. On reading, two of the ten papers were excluded, as full texts were unavailable even after directly contacting the authors (one was a conference poster and the other an abstract for submission that had not been accepted). A further paper was excluded at this point as although it included nurses, they were as a point of reference in a simulation and the study focused on doctors. This left seven papers to consider, with two of the papers reporting the same study led by Henneman, whereby the second paper solely focused on the methods of analysis, rather than the experiment and the task.

The remaining seven were critiqued using the same tabular format as that previously employed (Table 7). None of the papers found during this search fitted the systematic search presented previously, and are therefore considered here to ensure that the literature related to nursing and the use of eye tracking is considered.

Table 7: Literature search results related to eye tracking as a research method to explore nursing

Database	Hits	Comments	Papers
DelphiS	27	2 additional papers used as background	7
Cinhal	1	Already found	0
Web of Knowledge	57	8 relevant, already found	0
ACM	0		0
Engineering Village	16	6 relevant, already found	0
Google Scholar (top 100 hits reviewed)	25 relevant	3 new, 22 already found	3
			10 TOTAL (7 after final review)
Keywords used: nurse or nursing + eye movement or eye tracking			

The development of technology and reduction in cost and increased availability may explain why these papers have been published with increasing speed in the last few years; one paper in 2011, one in 2013, two in 2014, two in 2015 and one in 2016. Five papers (Browning et al., 2015; Henneman et al., 2014; Broadbent et al., 2014; O'Meara, 2011; Suetsugu et al., 2016) all used head mounted eye tracking in the form of glasses. This is an interesting development, at the wearer's eye movement is recorded in real time as they move freely about their environment. Each of these papers used this technology within a simulated environment to capture the eye movement of the wearer. The captured data was then been used in different ways, with four papers considering decision making (Browning et al., 2015; Henneman et al., 2014; Broadbent et al., 2014; Suetsugu et al., 2016) by combing it with outcome measures such as correctness and accuracy (Henneman et al., 2014; Marqurd et al., 2013) or for student feedback (Henneman et al., 2014 O'Meara et al., 2011).

Table 8: Papers from systematic search focused on nursing and eye tracking as a research method

Domain and focus	Method, design and task	Data analysis	Results and conclusions
Broadbent, M., Horsley, M., Birks, M., Persaud, N. (2014) Comparing Novice and Expert Nurses in Analysing Electrocardiographs (ECGs) Containing Critical Diagnostic Information: An Eye Tracking Study of the Development of Complex Nursing Visual Cognitive Skills. *Current Trends in Eye Tracking Research,* 297-315			
Nurses analysing electrocardiographs	Exploratory design, 4 ECG's	Interpretation and error	More experienced spend longer on relevant AOIs but did not interpret significance
Browning, M., Cooper, S., Cant, R., Sparkes, L., Bogossian, F., Williams, B., O'Meara, P., Ross, L., Munro, G., Black, B (2015) The use and limits of eye tracking in high-fidelity clinical scenarios: A pilot study. *International Journal of Nursing,* 25, 43-47.			
Nursing and paramedic pre-registration students simulation	Experimental in simulated environment ET using head mounted	Mean total gaze on expert designated areas of interest (AOIs)	Performance improved by third scenario. No significant difference in AOIs
Henneman, E., Cunningham, H., Fisher, D., Plotkin, K., Nathanson, B., Roche, J., Marquard, J., Reilly, C., Henneman, P. (2014) Eye Tracking as a Debriefing Mechanism in the Simulated Setting Improves Patient Safety Practices. *Educational Dimensions,* 33(3), 129-135.			
Nursing simulation	RCT pre-and with three types of feedback Verbal, eye tracking and both	Outcome and error	All groups improved in post-test. ET opportunity to give specific feedback.
Marquard, J., Henneman, P., He, Z., Fisher, D., Henneman, E. (2011) Nurses' behaviour and visual scanning patterns may reduce patient identification errors. *Journal of Experimental Psychology: Applied,* 17(3), 247-256.			
Nursing, medication administration	Experimental, simulated medication administration	Error identification as identifier	Error recognising nurses appear to have patterns
Marquard, J., Junghee, J., Henneman, P., Fisher, D., Henneman, E. (2013) Can Visualisations Complement Quantative Process Analysis Measure? A Case Study of Nurses Identifying Patients Before Administering Medications. *Journal of Cognitive Engineering and Decision Making,* 7(2), 198-210.			
Nursing, medication administration	Used data from 2011 study to demonstrate three different visualisations	Data processing	Visualisations may be effective for comparing sets of process execution data
O'Meara, P., Munro, G., Williams, B., Cooper, S., Bogossian, F., Ross, L., Sparkes, L., Browning, M., McClounan, M. (2015) Developing situation awareness amongst nursing and paramedicine students utilising eye tracking technology and video debriefing techniques: A proof of concept paper. *International Emergency Nursing,* 23, 94-99.			
Nursing and paramedic students in simulation	Quasi-experiment before and after part of Browning et al)	Student satisfaction	Participant performance improved by 3rd scenario. ET and point of view recording feasible
Suetsugu, N., Ohki, M., Kaku, T. (2016) Quantative Analysis of Nursing Observation Employing a Portable Eye-Tracker. *Open Journal of Nursing,* 6, 53-61.			
Nursing, novice and expert	Experimental comparing expert and novice in simulated environment	Gaze points including percentage and average on AOI	No significant difference although students focused more on numerical data

2.6 Themes Arising from the Second Literature Review

There were two common themes seen in these papers: (1) they were exploratory studies; and (2) they employed technologies that at the time of publishing had a relatively limited evidence base.

All of the seven studies are exploratory in nature due to the limited evidence concerning the use of eye tracking in nursing, and in particular the use of head mounted cameras. Browning et al. (2015) reported on a pilot study using head mounted eye trackers to explore the patient observational skills of final year paramedic and nursing students. However, the presentation of the eye tracking data is limited as the focus is the feasibility and exploration of the concept. Browning et al. (2015) concluded that there does appear to be a correlation with improved performance and gaze focused on the patient's body in the later simulations, and they use this as justification for the development of a larger study that at the time of writing had not yet been published.

O'Meara et al. (2015) present the results of a quasi-experimental before and after study which combines the use of head mounted eye tracking with debriefing to improve situational awareness and feedback in simulated practice. There is no report on the eye tracking within this paper, only the conclusion that the students felt that the ability to see their eye movement during the facilitated feedback session added to their learning, but that the debrief and video itself were of more use.

Suetsugu et al. (2016) combined head mounted eye tracking and simulated practice to explore nursing observation and do provide an analysis of the eye tracking captured. The conclusions presented within the paper suggest that there is little difference in the gaze points between the student nurses and the experienced nurses, although what they focused on was different. Those with less experience focused on information that was numerically displayed rather than the patient, arguably looking for the objective rather than the subjective information presented when looking at the patient. This is a key characteristic of the less experienced and supports the supposition that those with less experience lack the knowledge and ability to gather information from the patient themselves.

Broadbent et al. (2014) used a desktop eye tracker to capture the eye movement of three groups of nurses (year one and three undergraduate students and qualified nurses) when viewing electrocardiograms. There is no verbal data reported in this study and therefore assumptions are made as to what the viewer was looking at, which may or may not have been of interest to them or part of their decision-making. The study reports that the more experienced tended to spend

longer on the areas that would provide diagnostic information; however, without verbal data and sequencing being discussed conclusions are not possible.

In the two papers by Marquard et al. (2011, 2013) head mounted eye tracking is used to empirically test the behaviours of nurses during medication administration. The study concluded that those who made fewer errors followed a non-random scanning pattern between areas of interest (AOIs). No verbal data is collected or reported within this experimental study with the outcome measured in terms of errors made.This appears to be a missed opportunity to explore the decision-making and knowledge base of the participants.

Henneman et al. (2014) concluded that eye tracking as a debriefing mechanism in the simulated setting improves patient safety practices. This conclusion was drawn after a three-arm experiment that included the usual practice of verbal debriefing after a simulation, verbal debriefing with watching eye movements, and watching eye movements alone. The conclusions drawn by Henneman et al. (2014) suggest that the use of eye tracking improves the students' knowledge post-simulation, where there was a combined need for auditory and visual conformation (i.e. checking the patients name band and details). However, it does not appear that Henneman et al. (2014) have considered the length of time between the simulation and debriefing as a variable. Those that were assigned to the arm watching the eye tracking alone did not view this until three days after the event, yet both of the other groups received feedback straight away. This delay may have contributed to the outcome as evidence suggests that timing is crucial (Hatala et al., 2014; Thornock, 2016). As the use of head mounted eye tracking is still relatively new within the field of eye tracking research, it may be that not enough is known to be able to draw conclusions with regards to eye movement patterns. This is certainly an area for exploration in the future.

2.7 Limitations of the Literature Reviews

Every effort has been made to ensure that this review of the literature is robust and has identified all the relevant papers; however, the limitation of a literature review of this nature is the complete reliance on previously published research and the availability of studies. A clear method outlined in section 2.2 was based on extensive reading and consideration of the keywords and a process of trial and error, supported by discussions with expert librarians. The synthesis of the findings supports the belief that the key papers have been found and critiqued, and that the purpose of the literature review as presented in section 2.1 has been met.

A conscious decision was made to limit the literature review to ensure that only relevant papers were considered, and this may be considered a limitation of the search; however, this was based

on the sound theoretical proposition that the cognitive demand due to the task was key (Clarke et al., 2006; Duchowski, 2007; Krol and Krol ,2017). This is particularly relevant to the literature regarding eye tracking, as there is a plethora of evidence concerned with reading and in fields such as aviation and website navigation, and this literature was invaluable to developing a knowledge base from which this decision could be made.

2.8 Conclusions from the Literature

All the papers identified through the search that were read in full and have contributed to this chapter and the conclusions and design of the study. Key texts by Duchowski (2007) and Holmqvist et al. (2011) have been used throughout the development of the study and have supported the author's knowledge development in this and associated methodological fields. The decision to search in the manner discussed within this chapter was influenced by the evidence available and the specific requirements of the study. All of the nine studies in the original critique used dynamic stimuli, but were all contained within one frame, meaning that identification of AOIs is straightforward. However, nursing is a dynamic action and therefore consideration needs to be given with regards to when the stimulus and actors (used in the sense of individuals within the frame) move. Whilst there is extensive literature concerning the use of eye tracking in fields such as aviation, driving and reading, these have not been explicitly considered within this chapter, although they have contributed to developing an understanding of what is possible. The theoretical basis of eye tracking clearly supports the fact that the task is important when tracking eye movement (Duchowski, 2007; Holmqvist et al., 2011; Rose, 2016). Therefore, drawing on research that does not contain a dynamic stimulus, or one where the participant can alter the stimulus, will theoretically alter the eye movement, as the task is different thereby altering perception, cognition and consequently eye movement.

Bringing together the literature that has been presented in Chapters 1 and 2, and it is clear that there are four conclusions that can be drawn in relation to the research question: (1) there is a clear theoretical basis for the gaze as a concept to explore the nurse and nursing; (2) there is a substantive evidence base demonstrating that there are characteristics associated with those of differing skills levels that is task and context dependent; (3) there are a variety of methods available to explore the gaze, all with their own strengths and weaknesses; and (4) there is limited work considering a dynamic stimulus in eye tracking studies, and at present there is no published literature which focuses on nursing in this manner.

2.9 Chapter Conclusions

This review of the literature has concluded that there are visible characteristics associated with expert practice and that the cognitive and perceptive elements are open to exploration. There is a consensus within the literature that eye movement can provide insight into the cognitive element of visual assessment, as well as the participants' interaction with it, although this alone does not indicate what they found of interest and how they used this information. Therefore further methods that allow for the uncovering of these perceptive elements are an important consideration in the development of an experiment that seeks to explore both the cognitive and perceptive elements of nurses' visual assessment. Chapter 3 draws this literature review and its findings together through the production of a conceptual framework and presents the methodological considerations that underpin this study.

Chapter 3 - Methodology

3.1 Introduction

This thesis now turns to explore the ontological position and worldview, which provides a theoretical framework through which the research question can be addressed. In the two previous chapters the complex phenomenon of the gaze and its multiple components has been established. Drawing on my own beliefs and experience, as well as the literature and the debate presented thus far, the theoretical underpinning of this study is argued in the context of post-structuralist thinking.

3.2 Theoretical Underpinnings

Denzin and Lincoln (2005) talk of 'moments' that overlap and simultaneously operate in the present to illustrate an evolving spectrum of qualitative methodologies. They define these moments as: the traditional (1900- 1950); the modernist, or golden age 1950-1970); blurred genres (1970- 1986); the crisis of representation (1986-1990); the post-modern, a period of experiment and new ethnographies (1990-1995); post experimental inquiry (1995-2000); the methodologically contested present (2000-2004); and the fractured future (2005-). Writing in 2017, which Denzin and Lincoln termed the 'fractured future' or the eighth moment, I find myself debating my own position and perspectives. Influenced by the ever-increasing understanding and questioning of knowledge, and the development of technologies that may provide both additional answers and questions, leads to new spaces that welcome the use of texts in uncovering and exploring new knowledge in experimental ways.

During my career as a nurse in critical care environments I became comfortable with an approach to patient care that was often a pragmatic solution, based on the available information and resources, whilst considering the outcome for the patient. It was not a 'one size fits all approach' but a partly individualised one; what will work here and now? I have taken this same approach to answering the research question this study poses, and employed a variety of techniques drawn from different methodologies to create one which offers the opportunity to identify, explore and articulate the nursing gaze. This perspective provides a reflexive stance towards the conduct of the research and the analysis, thereby enhancing the richness of the analysis.

3.3 Post-structuralism

The term post-structuralism is a contested concept and a theoretical perspective within the literature, often used synonymously with the term postmodernism. It is therefore important to position this term within the literature and the influences of post-structuralist thought on this study. Post-structuralism is not a method in itself, rather it is a way of thinking about the world and that shapes the type of research undertaken and the types of analysis used (Cheek, 2000). Richardson and St Pierre (2005) consider post-structuralism as a particular form of post-modernist thinking, whilst Cheek (2000) and Harcourt (2007) argue it is a critical reasoning style focusing on meanings. Williams (2014, p.3) defines post-structuralism as:

> A thorough disruption of our secure sense of meaning and reference in language, of our understanding of our senses and of the arts, of our understanding of identity, of our sense of history and of its role in the present, and of our understanding of language as something free of the work of the unconscious.
>
> Williams (2014, p.3)

Post-structuralist approaches recognise the presence of multiple voices, views and methods when analysing reality. What is taken for granted as a unified and rational subject in modernist and structuralist thought is questioned and challenged, with focus on what and who is absent, as well as what and who is present (Cheek, 2000). Post-structuralism challenges the structuralist settled understanding of what is true, identifying repeated patterns that start with the norm and then only considering the deviations. Post-structuralists claim that 'the limit is the core and the post-structuralist defines the limit as a version of a pure difference', whose effects can be traced but limit not defined (Williams, 2014, p.3). In order to do this, approaches influenced by post-structuralist thought focus on exploration and the analysis of texts, where 'texts' refer to representations of reality. These texts may be nursing notes, images, drawings, interviews, newspaper reports, etc., and are all embedded within a discursive framework. That is 'they are constructed by understanding of particular discourses and in turn construct understandings in keeping with those discursive frames' (Cheek, 2000, p.42).

The common thread within post-structuralist thinking is the interrogation of language, meaning and subjectivity with 'language itself being constituted by, and constitutive of the social reality is seeks to represent' (Cheek, 2000, p.40). In this sense the limit, open and ungraspable can be 'explored through its traces and expressions in more fixed forms of knowledge' (Williams, 2014, p.3). As Derrida (1976, p.35) asserts: 'nothing is ever outside a text since nothing is ever outside language, and hence incapable of being represented in a text.' Drawing on language that is a visible limit, the invisible gaze at the core can be made visible. Williams describes Derrida as

'following the play of the limit at the apparently more immediate and truthful core of language' (Williams, 2014, p.3).

A problem identified in Chapter 1 was how to identify and articulate the nursing gaze, taking something that is illusive, open and ungraspable, and turning it into something that can be explored, analysed and understood. Drawing on the philosophical approach of Foucault offers the opportunity to develop a more complex analysis of what nurses see, challenging what may previously have been taken for granted; that nurses see and act on what they see. The conceptualisation of the nursing gaze directly draws from Foucault's medical gaze and supports the inclusion of multiple voices, as well as offering a way in which to represent and interrogate these with the nursing gaze as the limit. As Foucault (1989) states:

> A hearing gaze and a speaking gaze: clinical experience represents a moment of balance between speech and spectacle. A precarious balance, for it rests on a formidable postulate: that all that is visible is expressible, and that it is wholly visible because it is wholly expressible.
>
> Foucault (1989, p.139)

A key tenet of post-structuralism is the analysis of text, and a challenge here is how to represent the tacit as text. If 'we know more than we can say' (Polanyi, 1966, p.4), then how do we take the unsaid or unsayable and create a text? Adopting Derrida's belief that nothing is outside of a text and therefore anything can be represented as text, the question posed here is 'can eye movement be represented as text?' And if it can, does this address the thinking of Polanyi and provide insight into the tacit or unknown? Eye movement is an indicator of cognitive processes in visual attention; therefore, it should be possible to use this eye movement to create a text that would allow for it to be discursively analysed. Eye movements are uniquely poised between perception and cognition and are both constructed through the viewer's history, thus representing the limit in which to explore the core. The challenge is therefore not the capturing of the eye movement, but the transformation to text and the aspect of reality that it represents. The next challenge is how is this text to be discursively analysed, and if eye movement can be converted to text, then discourse analysis may be an appropriate method to interrogate the text in order to 'uncover unspoken and unstated assumptions implicit within them which have shaped the very form of the text in the first place' (Cheek, 2000, p.43). This addresses the challenge of making the tacit and unspoken, visible and a text to be seen, handled explored and articulated.

Discourse analysis is underpinned by the 'notion of language as a meaning constituting system which is both historically and socially situated' (Cheek and Rudge, 1994) or as Wittgenstein (1958) notes, language is not more or less correlated with what it represents but it is already 'a form of life'. Through interrogation of texts by the researcher to uncover the unspoken assumptions

implicit within them, what has shaped them comes to light in the context of a socially constructed reality. These implicit and unspoken assumptions provide an insight into the world in which they are said. Exploring what the individual says about what they see permits conclusions to be drawn with regards to the construction of their narrative. However, this analysis is dependent upon the researcher and their ability to negotiate the text created. Post-structuralism directs the researcher to understand self-reflexively and how their own narrative is a part of the text, thereby ensuring that the conclusions drawn are trustworthy.

The preceding discussions leads to the suggestion that this study could be characterised as a study of the discourse of nursing practice; however, this is not the case. Instead, discourse is used here as a means of gaining insight into the construction of the viewer who has negotiated the text and it is therefore appropriate to turn to an exploration of such discourse and how it may be understood in the context of this study. Traynor (2016) defines discourse analysis as:

> Investigations of how something is said or written (or performed in any other communicative way) not so much of what it is that is said or written. Its business is unearthing the mechanics of the text, not representing the life-world of those individuals who (appear to be) producing such a text.
>
> Traynor (2016, p.283)

Discourse analysis is underpinned by the 'notion of language as a meaning constituting system which is both historically and socially situated' (Cheek and Rudge, 1994, p.59), and it acknowledges the active role of language in the production of knowledge through 'texts' (Livholts and Tamboukou, 2015). Alvesson and Karreman (2000) place the various approaches to discourse on two axes, the level of discourse, and the extent to which it is understood as determining conceptualisation, sensitivity and meaning. The level of discourse is of importance here with the 'micro' focusing on the linguistic features of individual utterances or conversation to the 'macro' identifying and reflecting the broader, societal level at which the phenomena is situated and understood. The aim of this study is to explore the micro discourse, although the macro cannot be dismissed, as indeed the work of Foucault is considered by many to exemplify the macro discourse and has been influential in the development of this study and in particular the concept of the gaze.

This study adopts the approach of language regularities (linguistics), appreciating that the structure and function of language offers opportunities for the exploration of the meaning of the observed. In this way:

> Ordinary language is anchored in our real-life circumstances and needs – the way it has developed from and become shaped by those circumstances and needs – ensures that there is something of substantial significance here that we can really understand and operate with.
>
> Gustafsson and Sorli (2011 p14)

Drawing on methods of linguistic analysis and Austin's (1962) seminal work as a means of exploring the viewer's negotiation of the text is further discussed when the micro of the utterance is considered.

3.4 Austin's Performative Function as a Method of Discourse Analysis

I have long been fascinated with language, as in my clinical nursing practice certain words said in a certain way could have very different meanings and provide different instructions to the receiver of the message. The words 'can I have a hand please' from the nurse or doctor for the uninitiated may mean that a person requires help and there is no timeframe or necessary sense of urgency in the words; however, those experienced in the ways of the clinical setting know that these words, when spoken with an emphasis on the 'please' mean much more than that, as this signals that the speaker is in urgent need of help and assistance and that time is of the essence. It acts not only as a clear message to those who cannot only hear and interpret it, but protects others from the meaning of the message; that someone is in an extreme situation. But how do we know this? It was only when explaining to a first year student one day that their call for help had garnered rather a greater response than they had expected that I realised what we were doing with our language; it was more than the words but the function they were performing. Whilst Austin's work remained unfinished, his belief that utterances themselves do things on their own resonated with me. Reflecting on the call for help in clinical practice, the context, the tone, the speaker, the listener, means that sentence functions differently.

Austin's work challenged the long-held reductionist belief that the 'the business of a [sentence] can only be to 'describe' some state of affairs, or to 'state some fact', which it must do either truly or falsely' (1962, p.1). Rather than reduce words and sentences to analyse their meaning, Austin looked to describe the total speech act, and in doing so formed a method to describe a sentence in terms of the context in which it is uttered. Austin introduced the concept of illocutionary acts, whereby uttering a sentence the speaker performs an act which has meaning not only in what is

said, but also in how it is said, and the performance of saying it. By drawing on the associated linguistic conventions, the speaker is performing an act to the hearer.

Austin considered utterances to have a performance, and by exploring what that performative action is, introduced a new category of utterance that has no truth value since it does not describe the world but acts upon it, a way of 'doing things with words' (Austin, 1962). The main tenet is that all utterances are performative, even constative utterances [statement declaring something to be the case] have a performative act, and therefore all utterances must be viewed as actions (Leap, 2011). An example of a constative act is 'coal is black', which is true or false, but statements such as 'I name this ship' require conditions (felicity conditions) that cannot be evaluated in terms of truth or falsehood, and is therefore 'unhappy'. The felicity conditions developed by Austin were:

(A. 1) There must be an accepted conventional procedure having a certain conventional effect, that procedure to include the uttering of certain words by certain persons in certain circumstances, and further,

(A. 2) The particular persons and circumstances in a given case must be appropriate for the invocation of the particular procedure invoked.

(B. 1) The procedure must be executed by all participants both correctly and (B. 2) completely.

(T. 1) Where, as often, the procedure is designed for use by persons having certain thoughts or feelings, or for the inauguration of certain consequential conduct on the part of any participant, then a person participating in and so invoking the procedure must in fact have those thoughts or feelings, and the participants must intend so to conduct themselves, and further

(T. 2) must actually so conduct themselves subsequently

Austin (1962, pp.14-15)

Rather than being true or false, a performative utterance must have certain conditions in place and criteria that must be satisfied for a speech act to achieve its purpose. Austin's theory attempts to understand the ways in which meaning is created in context, allowing for the fact that whenever something is said it is also doing something. For example, a person may say 'it's hot in here', which is a valid statement but they may be performing a speech act asking for a window to be opened. In clinical practice I may have said 'that patient is unwell' to a colleague while what I meant was 'that patient needs closely watching'; my statement is performing an act without explicitly saying it. This statement can be further considered using Austin's (1962) three-part framework:

Locution – the precise words spoken ('that patient is not well')

Illocution – the actual meaning, or intention of the utterance (the speaker, in this instance me, wants the listener to keep an eye on that patient)

Perlocution – the effect the words I have spoken have on the listener (whether they keep an eye on the patient or not. The listener may just agree with me and not act on my words).

What can be seen is that it is not simply the words that are spoken but the performatives, the unspoken messages that are as, and if not more, important than the words themselves. Austin's work was based on the language of law where such rules or felicitations may be accommodated, but they failed to capture the 'messiness' of nursing. Austin's work has also been criticised as too simplistic and being speaker centred, failing to fully appreciate the impact of the utterance on the actions of the hearer (Yoshitake, 2004), and being a 'cryptic text'. Despite this it has been influential in the development of understanding language, and the proposition that utterances have a performative function is widely accepted, although its details are debated dependent upon the philosophical standpoint. Discourse analysis assumes that linguistic material has an action orientation that is used to perform social functions, which it achieves through a variety of strategies (Lyons and Cole, 2007). Here the action orientation, or performative utterance to use Austin's words, is more than the micro of the text, as it includes the rhetorical functions to which the text is orientated. Simply put, Austin's theory of performative utterances offers the opportunity to explore not only what the speaker is saying, but also the purpose and performative function.

The premise that language has a purpose is well established, and in this thesis the emphasis is placed on the verbal or spoken component and its function, arguing that verbal utterances have performative functions. When considering ways in which to approach the verbal utterances that would be collected as data within this research, attention was paid to the speaker, the task and the purpose. The premise of an utterance having a performative function held resonance, and a framework was developed from Austin's work, as seen in Figure 3. This resulted in the development of approaches taken by the speakers based on the performative function, with the emphasis placed on the signalling of behaviours deemed to be related to the task of assessing competence.

Locution	What was being said, the precise words	*The linguistic use of words, appropriateness, use of jargon and professional language*
Illocution	What was the speakers meaning	*The speakers judgement on what they intend*
	What was being signalled	*Speakers judgement on what they are seeing and how they are interpreting what they see*
	How it was being said	*The prosody of the speaker*
	The context of the utterance	*Appropriateness and relevance to the task and the utterance*
	The validity of the speaker	*The background, history and status as premise on which to pass judgement*
	The validity of the listener	*The background, history and status as premise on which to pass judgement and to understand the message being conveyed*
Perlocution	The effect on the listener and the receiving of the message	*The actions undertaken by the listener*
The performative function		*A combination of all the preceding constructs*

Figure 3: Proposed framework of performative utterances based on Austin (1962)

This approach demands that the hearer is able to receive, interpret and make sense of the message that the speaker is making; they must have insight into the context of the utterances and the message, knowledge of the situation, and in this instance, professional knowledge in order to interpret with confidence and accuracy.

The nursing gaze as seen here bears resemblance to the schematic diagram of a general communications system as theorised by Shannon (1959, p.5) and shown in Figure 4. Within this system there are five parts: the information source produces a message or sequence to be communicated to the receiving terminal, and this then produces a signal (which may be perturbed by noise) to be sent to the receiver and the final destination. Austin's performative function and the emotional prosody contained within the signal then adds to the veracity of the message.

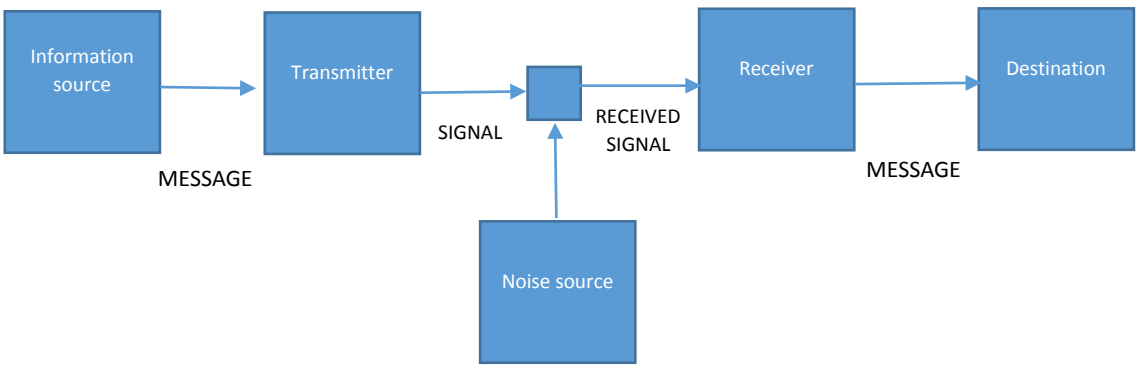


Figure 4: Schematic diagram of a general communication system
From Shannon (1959, p.5)

3.5 Emotional Prosody

The illustrations of performative function are on one level words and are one-dimensional, requiring interpretation by the hearer to make sense of the message. Returning to the example given in section 3.4, namely the call for help where the emphasis on the word 'please' is key to the message that is being sent. It is not the word itself, as one would consider the word 'help' to be key, but what if it was not? What if the way in which the message was conveyed was more reliant on the sound of how it was said? Speech is full of variation, uttered by different people in different contexts with varying duration and amplitude carrying information about the speaker and abundant social information (Kim, 2015). Exploring the phonetic variation and the phonetically cued messages offers an opportunity to consider the message of the utterance that goes beyond the meaning of the words. When combined with Austin's belief that utterances have a performative meaning, an exploration of the emotional prosody of the speaker permits a greater insight into the message being conveyed and the validity of the interpretation.

Rigoult and Pell (2012) define emotional prosody as:

> The melodic and rhythmic components of speech that listeners use to gain insight into a speaker's emotive disposition; a detailed description of the physical (i.e., acoustic) and psycho-perceptual attributes of discreet expressions of emotion through prosody is provided by.
>
> Rigoult and Pell (2012, p.1)

Emotional prosody is heard and not visible in the text, requiring turning to the text by the receiver of the message. It is different from what is being said and it is the emotion within the voice which offers auditory clues to the speaker and their intention. Austin may have referred to this as part of the illocutionary acts addressing the felicity conditions, with the speaker conveying a message that is more than the words said. Borrowing from discourse analysis, the approach developed within this thesis draws together the actual and the intended message, incorporating both micro and macro linguistic considerations. Inclusion of the emotional prosody of the speakers, insight is obtained to not only the performative function of the speaker but also their perception and cognition of what they are seeing.

What may be heard in the emotional prosody does not necessarily mean that this is how the speaker intends their point to come across to the listener. In the moment, they may witness what they perceive to be good, bad or indifferent, and this is reflected in the emotional prosody and performative of immediate utterances. However, on reflection what they have seen may be contextualised and a different judgement made of what they have seen. It is therefore important to consider not only what is being said whilst it is being said but how it is used by the speaker, and

semi-structured interviews afterwards offer an opportunity to explore and confirm this. Whilst this was evident in the analysis of the data in phase one, significance was determined later with the larger data set gathered during the experiment in phase two. This is therefore discussed in both Chapters 7 and 8.

3.6 The viewer as the Negotiator of Text and Constructor of Knowledge

From the beginning of the study it was clear that the key to exploring and identifying the nursing gaze is the viewer and their interpretation of what they are seeing. In this sense, the viewer is the constructor of knowledge and it is the role of the researcher to capture this and the associated meaning, through combining the multiple voices to develop valid conclusions. In order to do this, using video (as presented in Chapter 2) as the text for the viewer to negotiate, offers an opportunity to see 'the viewer/reader as a powerful source of signification in the construction of anthropological knowledge' (Martinez, 1992, p.132). This challenges a long-held belief that it is the author or anthropologist who is the only person who can construct anthropological knowledge. Its use in this way, asking the viewer to negotiate the text, offers opportunities to explore the nursing gaze from the perspective of the holder of the gaze via their active role in negotiating meanings (Martinez, 1992). As Berger (1972, p.9) states: 'we never look at just one thing; we are always looking at the relation between things and ourselves.' Here the purpose is the co-construction of signification and knowledge from the viewer through which meaning can be uncovered. The text cannot be perceived in all of its aspects at once, as when reading a text we are constantly adjusting our picture with the new information reconstructing the text in light of the new information and ourselves as a meaningful totality (gestalt) (Iser, 1978; Martinez, 1992). Therefore, whilst the viewer's thoughts whilst watching are an important part of their negotiation, the opportunity to consider the whole, prompted by the use of questions, is an important consideration.

3.6.1 Identifying a Text for the Viewer to Negotiate

Identifying a text demands that attention is paid to the purpose and availability of the stimulus. The reader must have something on which to explore the text, assimilating the text with their own experience as they make sense of it in the context of their own experiences and understanding. The reader (viewer) brings with them everything that makes them who they are: their history, beliefs, experience, knowledge and understanding. Through this gaze they read the text and construct a reality though an integration of the text, as Martinez (1996, p.142) states: 'readers do not read texts, they write them.' With this in mind, a video of simulated nursing practice was decided upon as an appropriate text for the viewer to negotiate and construct

knowledge. Familiarity with simulated practice, as well as the literature, led to this decision being made. The use of video as the stimulus provides four advantages (Pink, 2006; Chan et al., 2010; Jewett, 2012):

1. The same stimulus can be viewed by more than one person
2. Video captures the real-life element of the situation and provides sight and sound
3. AOIs can be identified prior to the viewing of the video to facilitate analysis
4. The stimulus can be returned to time and again without decay

Careful consideration was given to the use of a video of simulated practice, as this in and of itself not 'real practice'. In Chapter 1 simulated practice and the context in which it is used within the author's educational practice was presented, and this is revisited here to support the decision to use a video of this practice. The initial decision to use such a video was a pragmatic one, I had access to a number of such videos, and explorations with practice settings and their research and governance departments proved unfruitful in gaining access to or filming my own videos of nursing practice. Difficulties in accessing or filming nursing practice led to a reconsideration of what was important in the text, was it the patient or the nurses? What was it that I wanted the viewer to negotiate? I theorised that the use of a video of simulated practice would be a suitable text for the viewer to negotiate on, constructing their knowledge, though which I would be able to develop a greater understanding of the nursing gaze. This became the first of a two phase study drawing on existing data to develop methods which would allow for the development of a text and co-construction of a conceptual framework of the nursing gaze through the text of novice and expert nurses.

3.7 Development of a Conceptual Framework of the Nursing Gaze

At this point it is important to turn again to the nursing gaze, drawing on the literature enabled the creation of a conceptual framework of the nursing gaze that acts as the guide for the remainder of this thesis. An initial conceptual framework of the nursing gaze was developed from the literature presented in Chapters 1 and 2, as well as my own ontological view, and is presented in diagrammatic form in Chapter 5. Presenting the gaze in this manner allows for the complexities of the gaze to be illustrated and the interconnections to be seen. The conceptual framework of the nursing gaze places vision at the fore, as being key to the nursing gaze, but appreciates and recognises the complexities embedded within it. On the left of the framework the perceptive and cognitive elements of the gaze are highlighted, with the gaze-to-text method developed in this thesis used to explore these, drawing on both eye movement and verbal utterances. On the right of the diagram are the influences on the gaze, those components that

combine to form the gaze on the object of it are situated in the centre. Of equal importance for this study is the listener, whose own gaze will influence the reading of the text created by the holder of the gaze.

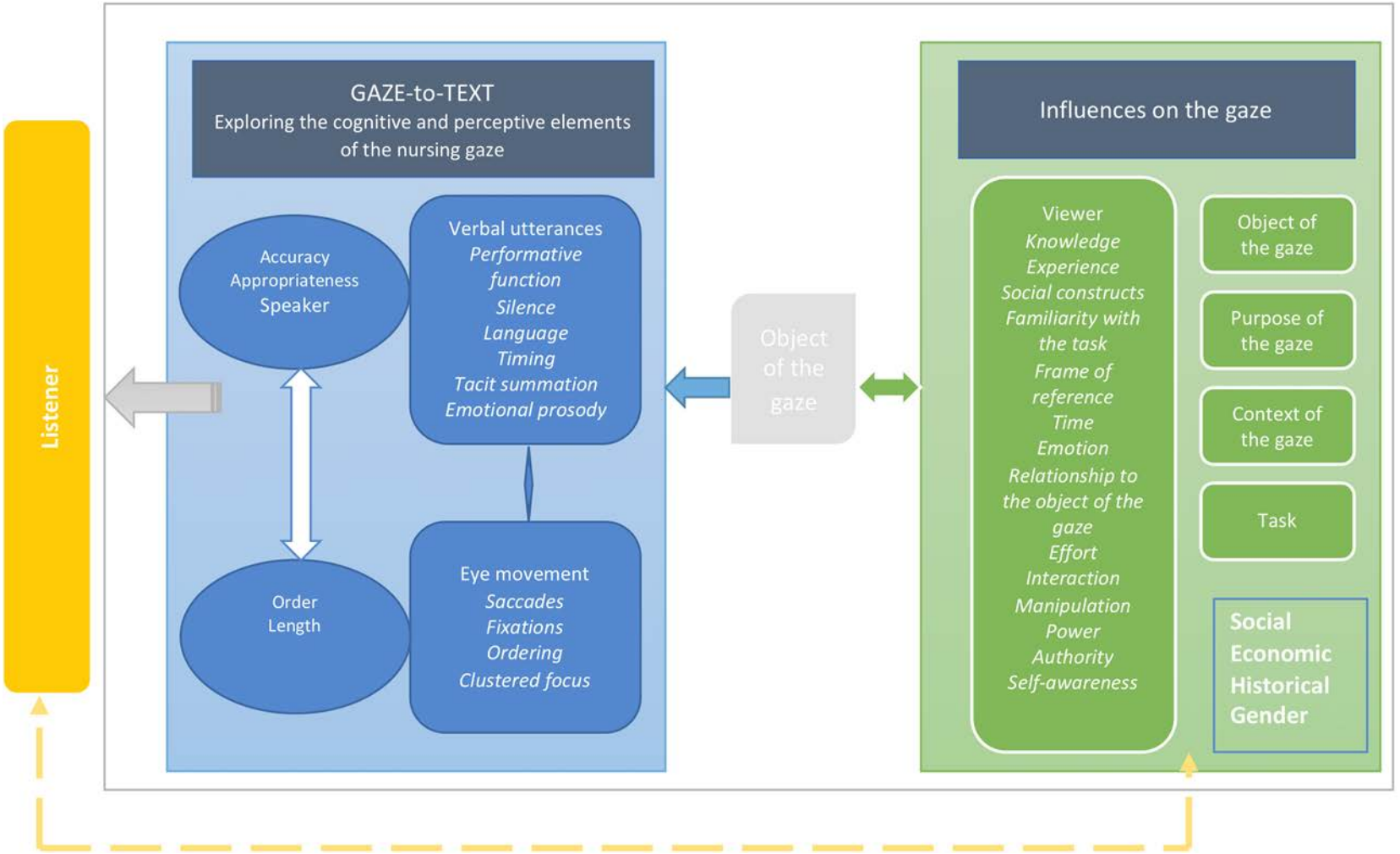


Figure 5: Conceptual framework of the nursing gaze

KEY: Solid line indicates direction of gaze, broken line indicates listener's own gaze

3.8 Influences on the Gaze

The literature search identified influences on the gaze which can be considered as external, history and social, influencing the viewer in a manner in which they may not be aware of. These influences shape who we are and how we respond to what we see and hear (Gergen, 1973; Vignoles et al., 2006). Foucault (1989), in his concept of the medical gaze, talks of the socialisation of the doctor which determines the way in which situations are approached and diseases understood. These influences cannot be manipulated in the moment but may be seen through the gaze, and Foucault uses the word 'gaze' to encompass not only the object of the knowledge but also the knower (O'Farrell, 2005).

It is not within the purpose of the thesis to explore these influences, although the power of linguistics represents a means of gaining insight into the social, political, historical and economic influences that have shaped the viewer. Gender is placed within this grouping, as it is not a variable that can be manipulated and is shaped by the others. There are however other influences which are open to change and manipulation in the sense of using them within an experiment. These can be grouped into five categories: (1) viewer; (2) object; (3) purpose; (4) context; and (5) task. Each of these will influence the gaze, and an example of this is the gaze held by an experienced nurse who is tasked with post-operative observations of a patient, with each of these variables considered and contrasted against a novice student nurse.

(1) The viewer is a registered nurse who has the experience to be able to contextualise the task at hand, and is familiar with the environment and possible needs of the patient. Their experience leads them to have a good grasp of what is required and how to go about it; they are experienced enough to be able to adapt to the situation if required. The novice has theoretical knowledge of the task and the situation, but has not developed the psychomotor skills to the degree that they can perform them without absolute concentration. They are unable to focus on anything else but the task, and when asked to describe what is happening they will offer facts as they see them, a thinking description of the event.

(2) The object of the gaze is the post-operative patient; the nurse is holding the gaze but the patient as the object of the gaze is gazing back, and they are therefore influenced by their own expectations, wants, needs and conceptions. The interaction between these two gazes holds opportunities for the task to change or the way in which it is conducted to alter. This is the same for the novice, although the novice's gaze will be focused on the task at hand and they will be unable to see the greater picture, being aware and responding to the patient. The patient's gaze also changes as they are aware of the status of the student and therefore have expectations as to what to expect and how to act. In this situation there is often another gaze to be considered, that

of the nurse who is mentoring the student. This examining and assessing gaze adds to the complexity of the situation and will influence that of the patient and the novice.

(3) The purpose of the task for the nurse is to assess the patient's condition, to detect any actual or potential problems and risks, as well as to fulfil their professional duty. The task contains psychomotor skills, empathy, communication, competency and skill, together with the ability to react and relate to the patient. Where the novice may focus on the task and the psychomotor element, the experienced nurse is able to prioritise and adapt to the situation, making links between what they detect and the holistic picture.

(4) The context includes the environment and what is available to the nurse and novice, and their ability to interact with it. The experienced nurse may not rely on equipment to support their undertaking of the task to the degree that the novice will need to. The experienced nurse will also have cognitive pictures that they have built through experience and will be able to draw on these in the undertaking of the task. The context also includes the condition of the patient, the potential for deterioration, the presence of others, noise, competing demands, and whether the task is developmental or assessing the novice's ability.

(5) In some ways, the task is the culmination of all of the previous four, although there is more to the task than the psychomotor presented here. The experienced nurse will have knowledge and awareness of the need for a holistic approach, aware of not only the main components of the task but the potential for other tasks to be achieved. In this example, the monitoring of observations offers the opportunity for the nurse to explore the patient's understanding of the situation and to voice any worries or concerns. The novice, whilst they may know that this is part of the task, they may not yet be able to practice this, as it demands that they are competent with the psychomotor so that they are able to allow their focus to be shared.

The object of the gaze is placed here within the influences but is also a main component, as it is the object of the gaze. What are not considered here are the object's (patient's) influences on the gaze, although this needs to be taken into account as their gaze may influence that of others. Placed within the centre of the conceptual framework the object becomes the holder of the gaze with the same influences playing their role in the gaze.

3.9 Ensuring Trustworthiness with the Researcher as Listener and Receiver of the Message

Whilst the viewer of the video is the negotiator of the text, the listener must also negotiate the text that is the viewer's interpretation. It has previously been established in this thesis that the message must be received and heard by an appropriate person who is able to make sense of what they hear. In this instance I, as the researcher, am the receiver of the message and I am therefore unable to divorce myself from who am I in order to do this. It is therefore important to be cognisant of this to ensure that it forms a part of the reflexive analysis of the data. As a registered nurse, an educator, and a researcher, I receive the message and interpret that message with these influences. Whilst this means that I am able to receive the message, I am also aware that I hear and see it through my own gaze, and therefore this is represented in the diagrammatic representation of the gaze and forms a part of the analysis of the data presented in subsequent chapters. Ensuring trustworthiness it vital in any research, and in the subsequent chapters this is returned to, detailing the steps that were taken to ensure that the reader of this thesis is able to draw their own conclusions and understand my reading of the text.

To support the trustworthiness of the conclusions, Kahn's (1993) proposal of three ways that a methodologically convincing story can be judged were considered in a reflective diary focused on the investigators relationship with: (1) the participants; (2) the data; and (3) the readers. This included questioning my own my own interpretations of the data, and discussing and checking with colleagues with similar clinical experience. Whilst their filter is their own, the similarities provided confidence in the findings and interpretations, and Chapter 8 returns to this when discussing the trustworthiness of the study.

3.10 Chapter Conclusions

Drawing on the work of Nightingale (1860), Benner (1984) and Scholes (2006), this thesis aims to contribute to the development of the theory of nursing through the uncovering of the nursing gaze by 'enabling articulation to itself and its novices' (Gobbi, 1984, p.28). As previously discussed, the nursing gaze is complex and requires methods of elicitation that address this complexity. After reflecting on my own worldview and positioning myself as a post-structuralist, this chapter has presented a conceptual framework of the nursing gaze. The creation of such a framework supports the subsequent design of the study and the development of the hypothesis that the gaze can be turned into text. This requires the development of methods that appreciate the complexities and allow for multiple voices, and is the foundation on which the first phase of a two phase study is based. The development of the conceptual framework and consideration of

the poststructuralist way of thinking led to the development of a two phase experimental study. Phase 1 is presented in Chapter 4; the results of this phase are reported in Chapter 5 and are drawn on for the development of phase 6, seen in Chapter 7. Drawing both phases together Chapter 8 discusses the findings in the context of the literature.

Chapter 4 - Phase One Methods

4.1 Chapter Introduction

The preceding chapters have established that drawing on a post-structuralist approach and turning the gaze to text provides a theoretical underpinning on which to proceed in order to address the aims of the research identified in Chapter 1. To test the hypothesis that the nursing gaze can be identified and illuminated drawing on eye tracking and verbal utterances, a two phase study was designed. The first phase was developed to test the tools that had evolved from the reading of the literature and the development of the nursing gaze. Beginning with the presentation of the aims and objectives of this first phase, Chapter 4 then moves to present the findings of this phase and discusses the methods employed. These are then revisited for the second phase of the study in Chapter 5 with conclusions drawn from both phases in Chapter 8t.

4.2 Aims and Objectives of Phase One

Whilst the literature outlined in the preceding chapters provided a theoretical standing from which to proceed, it demonstrated that whilst methods of capturing the cognitive and perceptive elements of vision are available, no one has combined them to consider the 'gaze'. The hypothesis that therefore drove this thesis was that the methods of capturing eye tracking and verbal utterances whilst a viewer watched and observed nursing practice could be brought together to identify, illuminate and articulate the nursing gaze. A two phase experimental study was designed with the first phase focused on examining the feasibility of this approach and the proposed methods which could then be drawn on to develop and run a second phase. This approach is well established in research as it allows for an evaluation of novel methods and development of a proof of concept (Leon et al., 2011). The aim of phase one was to test tools for data collection and analysis in order to: (1) determine which tools would provide the validity and reliability of analysis required to explore the nursing gaze; (2) identify lessons for phase two with regards to the gathering of data; and (3) add to the limited body of knowledge concerned with the use of dynamic stimulus in eye tracking experiments.

Chapter 4

Two aims were identified for phase one with the intention of developing the second phase and answering the main research question as presented in Chapter 1:

i. To develop a conceptual framework of the nursing gaze which will inform the development of the study
    a. What constitutes the nursing gaze?
    b. How can the nurse's gaze be identified?
ii. To develop phase two of the study based on the findings of phase one
iii. Using the identified components of the nursing gaze and the methods identified in phase one to undertake an in-depth analysis

The first phase of this experimental study consisted of five objectives:

1. Identify components of the nursing gaze as suggested by the literature review (as addressed in Chapter 3)
2. Identify and test methods to identify the nursing gaze
3. Identify whether video of simulated nursing practice can be used as an appropriate stimulus for the capture of eye movement and verbal data
4. Identify and test methods of analysis of eye movement when watching the video
5. Identify and test methods of analysis of the verbal data when watching the video

The gaze is a complex phenomenon and attempts have previously been made to explore it drawing on ethnographic techniques and theoretical discussions. As discussed in Chapters 1 and 2, each of these approaches has its own limitations, and with the development of technologies and our understanding of how to use these there are opportunities to explore phenomena in new ways.

I hypothesised in Chapter 3 that eye movement and verbal utterances of the viewer, as the negotiator of text, could be turned to text to enable the articulation of the nursing gaze. Data collected for a different study that culminated in the thesis entitled '*Video-View-Point' – Video analysis to reveal tacit indicators of student nurse competence* (Monger, 2014), enabled the testing of this hypothesis without the need for undertaking experimental work. This chapter draws on these data in order to test the hypothesis and therefore it is important to present the relevant information from Monger's study, as well as to clearly indicate the analysis undertaken for this study. A summary of Monger's work and how her study has influenced this one is considered in the next section.

4.2.1 Overview of Monger's Study

Monger' study revealed tacit indicators of competence in student nurses, drawing on the testing of Video-to-View-Point, her objectives are shown in Figure 6.

1. Test the hermeneutic approach and the BigSister/Eye tracker tools using the principles of experimental design with a number of purposively selected but randomly allocated observers.
2. Determine whether the tools facilitate the identification of the 'signified' in addition to the 'signifiers in the Think Aloud commentaries' i.e. can they identify tacitly understood behaviours, which are not amenable to articulation in addition to those, which can be described in words.
3. Determine whether it is possible to use the commentaries to produce a dialectic, which articulates collectively understood truths.
4. Use the technological tools to present the analysis whilst maintaining the context and truthfulness of the data.
5. Assess the Eye-tracker and Big Sister tools with respect to validity, reliability and usability, by comparing the outputs with each other, and triangulation with the transcripts from the semi-structured interviews.
6. Determine whether it has been possible to identify specific indicators of competence.

Figure 6: Monger's (2014) Video-View-Point research objectives

The following sections provide the background to Monger's study to provide the context in which the data was collected and to position the subsequent analysis of the data in the first phase of this study.

4.2.1.1 Participants

Monger (2014) purposefully recruited eight registered nurses with a variety of practice experiences and length of time as registered nurses for her study. Each participant was randomly allocated to an arm of the study with variables concerned with the technology and videos, using a cross over design (Table 9). This included the use of Big Sister technology and the eye tracker. Three participants' data were selected for this study (participants D, E, and H), as they had all viewed the same video (video two), used the eye tracker, and the data sets were complete. I was also a participant in the study but not one of the three who viewed video two. The data from video one was not used for this phase of the study and was held in reserve in case it was judged that the objectives could not be met through the analysis of one set of data. The second data set involved a different video which depicted the same scenario and used the same data collection tools.

The data consisted of eight participants (all experienced, registered nurses) who viewed and commented on two videos (17 and 18 minutes in length) of student nurses participating in a simulated practice environment where they were providing nursing care to the patient. The aim of the study was to reveal tacit indicators of student nurse competence and to test a new tool, 'Big Sister'. Big Sister is a bespoke piece of technology that allows viewers to click the mouse on AOIs whilst watching and verbally commenting on the video, all of which was recorded synchronously.

All participant identifiable data were removed and coding applied, which has been retained within this study. This is easy to achieve in test but the audio files needed for the original transcription mean that the participants would be identifiable. Participants were made aware of this during the consent procedure for the original study, and each participant was allocated a code for the purposes of the work. During the handling of the data the original ethical approval was abided by and the principles of the Data Protection Act (1998) followed. Consent was gained from the participants for the data to be used for research purposes (as reported in the original study) and permission to use the data in this study was gained from Monger (see Appendix B). The participant's biographical details and the arm to which they were allocated is shown in Table 9.

Table 9: Participant demographic information in Monger's study and arm allocation

	Participant	Tool	Video	Post observation interview	Tool	Video	Post observation interview	Years in practice	Years as a mentor	Field of practice
Arm 1	A	BS	1	✓	-----	-----	-----	30	20	Neuro rehabilitation
	B	BS	2	✓	-----	-----	-----	27	26	Critical care (R)
Arm 2	C	ET	1	✓	-----	-----	-----	30	20	Neuro rehabilitation
	D	**ET**	**2**	✓	-----	-----	-----	14	10	Critical care
Arm 3	**E**	BS	1	✓	**ET**	**2**	✓	3	2	Elderly care
	F	BS	2	✓	ET	1	✓	16	15	Critical care (R)
	G	ET	1	✓	BS	2	✓	15	11	Critical care (R)
	H	**ET**	**2**	✓	BS	1	✓	9	8	Emergency care

Key: BS – Big Sister, ET – Eye Tracker, R – reserve Monger (2014)
Bold indicates videos and participants used in this study

4.2.1.2 Video of Simulated Practice

The simulation consisted of a patient who required nursing care and whose condition deteriorated throughout the scenario, thereby requiring action from the students. The aim of the simulation was to put students in a realistic clinical setting requiring them to assess the patient and respond appropriately to the cues, drawing on their knowledge and experience. All students

involved were in their final (third) year of a nursing programme and had participated in simulated practice prior to this, using the same equipment and in the same location. The scenario used SimMan™, a medium fidelity mannequin connected to a monitor that showed the physiological observation and allows for interaction by both touch (pulse) and listening (chest and heart sounds) and is voiced by a member of staff who acts as the patient. The programme was pre-written, with events such as a change in electrocardiogram (ECG) that could be triggered by the person controlling the scenario from the control room. Another member of staff acted as the doctor and was available to the students at their request. A full description of the simulated practice is included in Appendix C.

The associated learning outcomes for the scenario were:

1. Undertake an appropriate physical assessment using a systematic approach
2. Recognise and appropriately respond to cues
3. Demonstrate safe clinical skills including recognition of own boundaries
4. Demonstrate effective and timely communication

Prior to commencing the scenario the students were familiarised with the simulated setting and introduced to the patient and their background through a nursing handover. All information that the students needed at that point was made available, and included observation charts and nursing notes. Participants were asked to act as themselves, final year student nurses, and instructed to care for the patient starting with an assessment of the patient's condition. With their consent and permission gained to use the data for research and educational purposes, the students were video recorded during the scenario using a static camera attached to the ceiling of the skills room (Figure 7).

Figure 7: Screenshot of the video from Monger's study

4.2.1.3 Data Collection

In order to collect data the participant as a viewer was sat in front of a desktop computer that had the Tobii TX eye tracker attached. They were then asked to watch the 18-minute video, thinking aloud their thoughts related to the competence of the students they were observing. These instructions were repeated on screen:

> I would like you to watch the following video. It is a group of students working in a simulated practice scenario. While you are watching it, I would like you to talk about what you are seeing in the students' performances which you think are important when it comes to assessing their competence. Just as if you were assessing them in practice, point out to me what are the good points and what are the worrying ones. There are no right or wrong answers. From a research perspective, we can only very broadly categorise competence and yet we all know 'OK' or 'not quite there yet' when we see it, and I'm really interested in what you see that makes you think those things. I do not expect you to cover absolutely everything about every student, I am just interested in the things that grab your attention along the way. Is that OK?
>
> Monger (2014)

The video play back and the eye tracking data used Tobii TX, a remote eye tracking unit which sits underneath the screen being viewed, collecting data in a non-obtrusive manner (Figure 8). The participants' audio utterances were recorded concurrently by Tobii TX and transcribed by Monger verbatim. The semi- structured interviews which took place after the viewing of each of the videos were audio recorded. Monger took field notes but did not transcribe them. I have transcribed these interviews verbatim for the purposes of this study, an important and active step in the process allowing for an accurate data set from which to work (O'Reilly and Kiyimba, 2015). The semi-structured interview consisted of questions pertaining to the use of the technology, the experience, and the students' competence (see Appendix D).

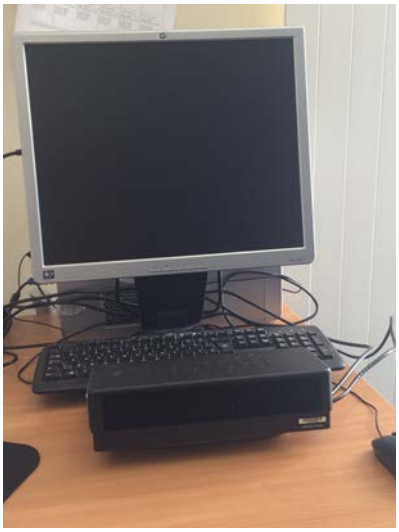


Figure 8: Tobii TX desk eye tracker connected to a desktop computer

Monger made available all of her data for use in this study, and that of three participants who watched the same video and had their eye tracking data, audio utterances and semi-structured interviews available were used. Monger refers to these participants as D, E and H, and the same coding has been used in this study to allow for crosschecking. The original video and eye movement with the participants thinking aloud were stored on the computer with the eye tracker software, and therefore all of the data is from the original, authentic recordings.

4.3 Data Analysis

The aim of the analysis for phase one was to determine whether meaningful conclusions could be drawn from the data drawing on the post-structuralist perspective that eye tracking and verbal utterances could be turned into text. This meant that tools needed to be identified and decided upon based on the data that was to be used for the analysis. Five aims were developed:

i. Develop coding of the verbal data that will provide insight into the participants perception of what they are viewing
ii. Explore how the data from the eye tracker can add to the analysis of the participant's conclusions
iii. Determine the value of using the eye tracker data in adding to the understanding of the participants cognitive processes
iv. Determine the value of statistical data from the eye tracker when the video contains dynamic features and movement
v. Combine the verbal utterances and eye tracking data to develop method

In order to achieve these aims, five objectives for phase one were developed which focused on the analysis of the data:

1. Turn the eye movement to text
2. Turn the verbal utterances to text
3. Identify codes and themes within and between each of the data sets
4. Draw conclusions from the data in relation to the tools
5. Determine the validity and reliability of the tools in relation to this phase

When considering how to analyse the data the first stage was to establish the best way in which to capture multiple voices and ensure that they were appropriately represented whilst looking for commonalities or themes. The ethnographic lens (the viewer as the negotiator of text) is combined here with the phenomenological (the viewer as constructor of their own perception of what they are seeing) and led to the decision to employ thematic analysis to the texts. This would

both allow for an in depth exploration and the analysis of multiple data sources with triangulation between them. The conclusions drawn from the literature review identified that the analysis of eye movement can be used to gain an insight into the interest of the viewer.

The following section describes the analysis of the data undertaken for phase one of this study. The aim was to test the hypothesis that eye movement and verbal utterances could be turned to text, drawing on the raw data collected by Monger. The first step was to demonstrate the complexity of using traditional eye tracking analysis and the challenges faced when the stimulus is dynamic video. Monger's study focused on the comparison between eye tracking and the bespoke tool BigSister, and she had not undertaken an in-depth analysis of the eye tracking data, making this was an opportune data set on which to do this. During this process a field diary was kept with notes on all elements of the analysis, which included ideas, thoughts, initial and changing coding and meaning. This was used throughout to support the process and to support reflexivity in the analysis and drawing of conclusions, a task that Mays and Pope (2000) consider to be key in ensuring quality when using qualitative methods.

4.4 The First Challenge, Eye Tracking Dynamic Stimulus

There are two significant challenges when using eye tracking with a dynamic stimulus: (1) defining AOIs to capture what the viewer is looking at; and (2) representing this on paper in a static form. The first challenge is due to a limitation in the software that requires that a static AOI be defined even though the video is dynamic. This requires the identification of a scene (user defined period of time in the video), the software then creating a still image from this scene, and the user being able to create the AOI on that scene. The difficulty here is that within the video people move around yet the AOI's are static and do not move with them. This then means that the user must create another scene, define AOIs again and continue this process each time one of those defined as an AOI moves.

The first step was to familiarise myself with the video and each participants' eye movements. This began with the careful documenting of events in the video and the watching of the participants' eye movement, speeding them up and slowing them down, whilst considering what the viewer is looking at. During this process notes were taken on: (1) movement patterns; (2) length of saccades; (3) length of fixations; (4) focus, and (5) interpretations of what is happening. For instance, does the eye movement follow an event? Does it track a person or object? This is an iterative process, moving between segments to identify themes and patterns and then seeking them in other areas.

The next step was to create of AOIs overlaying the video, as this provides the software with 'boundaries' of time in which the researcher is interested in and uses these to create data which include time spent on an AOI, fixation length and time between fixations. As this is a dynamic stimulus (video), it differs to those used in the literature that may often use a still image on which to create an AOI. Using Tobii TX the researcher is able to create these areas manually by drawing virtual boxes over the area of the screen that they are interested in. Care has to be taken to make a balance between creating a meaningful AOI over time and not too much movement of those within the screen. An example of the creation of AOIs in shown in Figure 9, where they are based on the four students visible on the screen. This is a screen shot, and as the students move within the video the AOIs do not move with them; thus creating the first of two significant challenges.

Figure 9: Screenshot from video showing four AOIs

The first challenge was how to record eye movement. Eye tracking can be recorded in a variety of different ways, and in this study the data was recorded by a desk-based tracker, although head mounted eye trackers are also available. When head mounted eye trackers are used the participant is free to move around and a much more dynamic stimulus may be gathered as they record the eye movement and film the scene. This leads to the need to consider approaches that take this into account and use it to the advantage of the researcher. For example, if a researcher is interested in the scanning behaviour of a person shopping in a supermarket setting, wearing a head mounted eye tracker allowing free movement enables the participant to wander around a shop for 30 minutes resulting in an abundance of data. The researcher may be interested in all of that behaviour and eye movement and would therefore need to create frame-by-frame AOIs, which is a time-consuming approach. However, if the researcher is interested in how the shopper behaved in a particular aisle, then they do not necessarily need to look at the whole 30 minutes;

rather they can identify the time of interest and create the AOIs either as a whole or frame by frame. A 30-minute video may then become a 20 second segment (Duchowski, 2007), which is akin to an ethnographic technique of identifying relevant areas of data are identified for in-depth analysis (Hammersley and Atkinson, 1983; Guest et al., 2012). By using this approach AOIs can be created within a segment and other methods of analysis used.

Figure 10 shows a snapshot that has captured the viewer's eye movement in the form of saccades (lines showing movement between two points) and fixations (circles represent the length of time, with the bigger the circle the longer the viewer spent looking at that point and a number indicates the order in which the points were looked at). This segment was 33 seconds in length and when it is played the saccades and fixations show in real time. When trying to illustrate this rich data and movement on paper it is more difficult, therefore a snapshot of the segment is created overlaid with the eye movement.

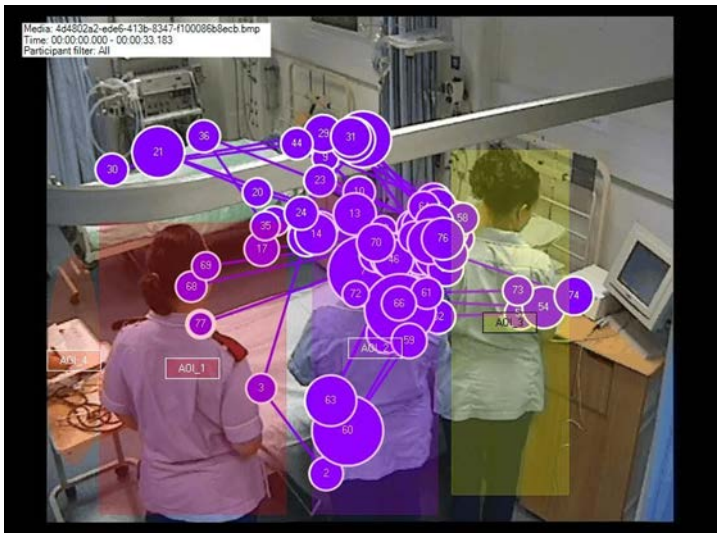


Figure 10: Screenshot of the video showing saccades and fixations

As the viewer watches the stimulus (in this case a video), the eye tracker records their eye movement allowing for viewing and analysis of the data. The eye movement can be watched in the form of fixations (circles) and saccades (lines) over the video, and as the eye movement is in real-time this allows for the viewer's eye movement to be seen. Figure 11, Figure 12 and Figure 13, show how these can be seen with screenshots indicating the building of eye movement over a period of three seconds. A difficulty with showing a dynamic stimulus is how to show the dynamic nature and movement, and these images here aim to show that movement. In order to address the second challenge of representing dynamic movement on paper, screen shots have been used with eye movement overlaid. This makes it possible to show the pattern of eye movement over a period within the video, thereby addressing the second challenge, how to show dynamic movement on a static medium.

Figure 11: Screenshot showing first fixation

Figure 12: Screenshot showing fixations one to five and the saccades between them

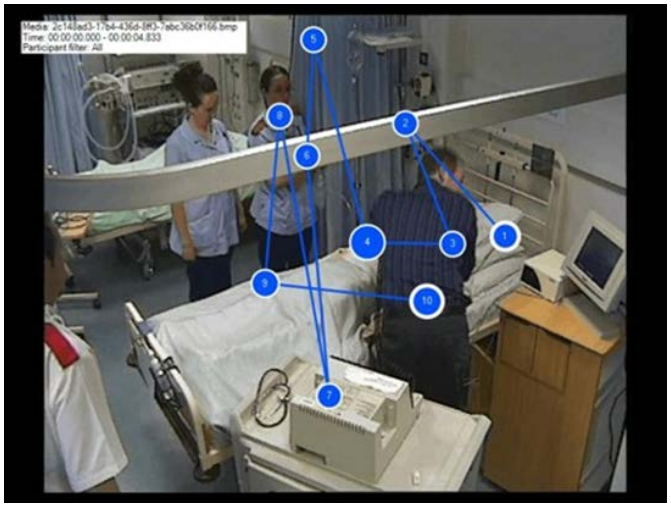


Figure 13: Screenshot showing fixations one to ten and the saccades between

4.5 Familiarising Self with the Data

Once the approach to the eye tracking data had been decided upon, the second step was to familiarise myself with the data. Drawing on the phases of thematic analysis described by Braun and Clarke (2006), the analysis of the data took place separately but was mindful of the entire body of data, moving between data points to understand the influence of one on the other. The process of analysis is discussed here as it illustrates and debates the approach taken, with the stages illustrated in Table 10.

Table 10: Phases of thematic analysis
adapted from Braun and Clarke (2006)

Phases	Description of Analysis Process
Familiarising myself with data	1. Narrative preparation 1.1. Description of events in the video recorded 1.2. Transcribed data from all verbal utterances and semi-structured interviews 1.3. Watched all videos with eye movement and verbal utterances overlaid 2. (Re-)reading the data and noting down initial ideas
Generated initial codes	3. Coded interesting features of the data in a systematic fashion across entire data set 3.1. Segments identified in video for further analysis 4. Collated data relevant to each code
Searched for themes	5. Collated codes into potential themes 6. Gathered all data relevant to each potential theme utilising matrix approach
Reviewed themes	7. Checked if themes work in relation to the coded extracts 8. Checked if themes work in relation to the entire data set 9. Reviewed data to search for additional themes 9.1. Generated a thematic 'map' of the analysis
Defined and named themes	10. On-going analysis to refine the specifics of each theme and the overall story the analysis tells 11. Generating clear definitions and names for each theme
Produced the report	12. Selection of vivid, compelling extract examples 13. Final analysis of selected extracts 14. Related the analysis back to the research question, objectives and previous literature reviewed

The first stage in Braun and Clarke's process is familiarisation with the data, and to do this I listened again to the recordings of the viewer thinking aloud, checking for accuracy and filling in gaps in order to confirm the accuracy of the transcripts. A difficulty with the original recordings is that not all the comments could be heard and where this was the case it was indicated in the original transcript as '???'. This appears to be due to the technology being used and noise from

the video. Where there remains a gap after my third listening, the same indicator has been used. I then transcribed the semi-structured interviews verbatim for the purposes of this study. Braun and Clarke's phases became the overarching process, with a specific method of applied thematic analysis developed by Guest et al. (2012) drawn upon to support the application of boundaries to the text.

4.5.1 Using Applied Thematic Analysis to Create Segments of the Video for Analysis

The difficulty in showing dynamic movement could be considered a limitation of the software, but it did lead to thinking differently about how the eye tracking data could be used when considering a stimulus such as video with dynamic movement of the participants. To illustrate this, Figure 14 shows four AOIs created on a screen shot of the video where there is no movement within the frame.

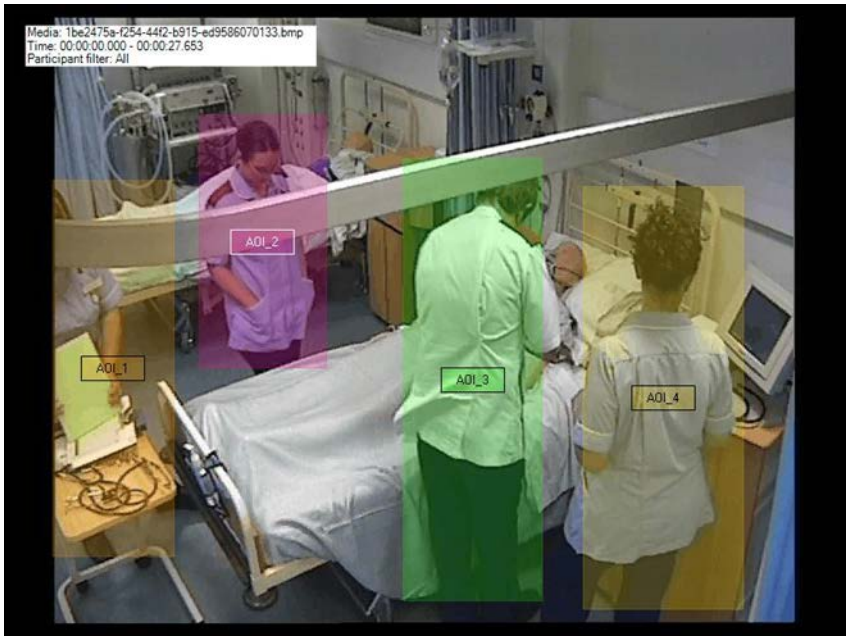


Figure 14: Screenshot with AOIs shown

In Figure 14 the AOIs can easily be defined and tracked, as whilst there is subtle movement this does not move the defined AOIs. However, when the participants move within the frame the AOI does not automatically follow them and therefore the approach of frame-by- frame coding would be required. To look at the viability of this, 30 seconds were watched frame-by-frame and AOIs defined. As the students moved within the screen it required the AOIs to be adapted over the frames and the 30-second clip took one hour to complete. Each of the three videos is 18 minutes in total and would require the creation of frame-by-frame AOIs. Even allowing for familiarity with the software and where the frames change, a conservative estimate was 100 hours of effort to achieve this.

With such rich data there was a need to prioritise the analysis, and the aims of this phase of the study supported setting boundaries around the data (Guest et al., 2012). It was therefore decided that sections of interest would be identified for analysis, an approach which has similarities to text segmentation and described by Guest et al. as:

> Bounding text in order to (1) assess and document the overall quality of the data and facilitate the exploration of thematic elements and their similarity, dissimilarity, and relationships.
>
> Guest et al. (2012, p.51)

A segment from each participant watching the video was identified where a clear signifier was verbalised. There are many such opportunities within the data and a pragmatic approach was taken regarding the choice of these segments which were of interest to the researcher and different in nature. Comments where the participant signified behaviours that were not indicating competence were used for this purpose and were based on the viewer's judgement.

This approach involves confronting questions about where meaning begins and ends, and how meanings interact and intersect. One way of doing this is to identify key words in the transcription and then exploring the data to either side of that key word. The boundaries in this sense are arbitrary and require setting by the researcher.

Guest et al. (2012) discuss this within the context as a tool for analysing text, and it is used here to provide 'boundary segments of the video'. Using this approach to capture and analyse eye movement provides four advantages:

1. Supports the identification of 'meaningful' sections of the video
2. Allows for standard statistical tests which facilitates comparison to other studies
3. Reduces the amount of data needing AOIs to be defined manually
4. Supports the in-depth analysis of pertinent areas

The issue then becomes one of identifying meaningful segments of the video. As the focus of this phase of the study was to consider the tools and their use, it was important to consider what I may want to achieve, therefore, the transcripts were reviewed and one-90 second section was identified for use in which all three participants were speaking and a 30-second segment where no participant spoke.

Deciding on where to start and finish the segments and to apply boundaries was initially a practical solution, as using approximately 30-second segments allowed for the identification of events on the video and to group participants comments. Another approach considered and employed was the identification of comments considered to be 'key', a process advocated in applied thematic analysis when considering transcripts and allows for the data to be explored

prior to and after a key event in order to consider what is happening. This approach was taken to the two segments identified and is shown in Table 11.

Table 11: Two segments identified from participants H and E

Segment	Participant	Start time	Finish time	Utterance
1	H	1222	1230	Jobs need to be assigned here, there needs to be more nurse leadership here
2	E	1657	1711	I'm worried about that girl's ability

As the viewer has been asked to think aloud a start point is the end of the previous comment and the beginning of the subsequent one. By identifying a key comment in the utterance and creating a segment with a boundary on the video, AOI's were identified and the statistical analysis of fixations and saccades gathered. This approach differs from that found in the literature review and provides a novel approach to the use of eye tracking data in a qualitative approach to understanding the data. It does not demand that every frame is considered and AOI is determined but identifies the key points within a dynamic video to be segmented and used. In the comment from participant H, what does more leadership mean? What are they looking at to make this judgement and is it the absence of or behaviours that they are seeing which leads them to say this? Why is participant E worried about someone's ability and who are they referring to? Questions that can be considered using a bounded approach.

Two segments were identified based on when all the participants were commenting. The first is shown in Table 12 and was decided upon as all three participants were speaking about a definable event in the video (patient complains of chest pain). During this scene one student is checking the patient's wound, another is asking the patient about the chest pain she has just complained about, and one student is on the phone speaking to the doctor (off screen). Chest pain is a significant clinical indicator that something is wrong with the patient and should be easily recognised as such by all of the participants watching the video.

Table 12: Video segment where all three participants are speaking

Minute	Event seen on video with timing	D's comments	E's comments	H's comments
0830	*0834* checking wound site *0834* asking patient about pain in chest	She's pushed the other student out of the way there, she wanted to get there and she's not doing anything	He's saying all the right things, he gave a bit of history of the patient, so the doctor knows why they are in hospital	Everyone has gone to interact with her at the same time I just want one of them to clean their hands please

A second segment was identified where none of the participants spoke (Table 13). This was one of two 30 seconds' segments where this occurred, with the first being the first 30 seconds of watching the video. During this segment there is action in the video, the doctor arrives, a student brings in the emergency trolley and another student moves a table out of the way, but why are the participants not commenting? With traditional observational ethnographic techniques what the viewer is looking at can only be postulated; here the silence is observed and seen. This is a significant point in the simulation as the patient is deteriorating and the students have recognised it enough to get the emergency equipment and prepare the area by moving obstacles out of the way yet the viewers are not commenting. The question asked here was, what is the eye movement during this time? What does the eye movement add to the understanding of what is being said or not said by the viewer?

Table 13: Segment where no participant is speaking

Minute	Event seen on video with timing	D's comments	E's comments	H's comments
1100 - 1130	*1106* student brings resus/emergency trolley *1114* table moved away from bed			

The eye tracker collects data on fixations and saccades, and allows for playback and visualisation of these, as well as gathering it in a way transferable to a statistical package such as SPSS. This allows for an in- depth statistical analysis of a number of variables, and means that further within and between analyses can be conducted. Well-established statistical methods are reported within the literature but due to how the eye tracking data is being used within this study, these are not appropriate due to the aims of the analysis and the small data set. The most common use of statistical data in eye tracking methodology is to compare large data sets for the same stimulus (Duchowski, 2007; Bojko, 2013); however, within this phase the three sets of data would not provide enough data to create meaningful statistical outcomes. In order to explore and demonstrate that the information that the eye tracker can display and its use within this phase, descriptive statistics concerning fixations are combined with visual data (heat maps and saccades) and are presented in Chapter 5.

4.6 Analysis of the Verbal Data

As outlined in section 4.5 Braun and Clarke's (2006) phases of thematic analysis were adapted and drawn on. The first stage in the analysis of the verbal data was to gain familiarity with the data, ensuring that it was in a form that is easy to work with and manipulate, whilst ensuring that nothing was lost. Drawing on Hammersley's (2010) nine core features of transcription, all verbal

data from the participants was transcribed as shown in Table 14. Hammersley's work was chosen as a useful approach for the novice researcher, as it supports the decision-making process and compatible with an ethnographic approach. There were two sets of verbal data available: (1) the utterances made whilst watching the video; and (2) the semi-structured interviews. Analysis of both and the approaches taken are detailed here.

Table 14: Core features of transcription applied to the verbal data in the study
Taken from Hammersley (2010)

	Core feature: the *researcher must*	**Application to verbal data within this study**
1	Make a decision regarding how much of the data to transcribe	All verbal data was transcribed
2	Make a decision regarding how to represent the recorded talk, including intonation, pitch, pace and dialect	Incorporated into the themes and codes table
3	Give some indication of who is being addressed in the talk	For each of the transcripts codes for participants were used and the explicit purpose of the talk
4	Decide whether to include paralinguistic features	Included to add to the richness of the data
5	Make choices whether to include pauses in the transcription	These were not included as at the time of transcription
6	Decisions regarding whether to include gestures and fine motor movements	Not applicable due to audio recording only
7	Think about the lay out on the page including decisions representing overlapping or interruptive talk	This is seen in the tables where the talk is allocated to the speaker
8	Decide how to represent the speaker and addressee	The participant codes given by Monger these have been kept.
9	Consider how they represent their transcripts in dissemination by deciding where to open and close a particular abstract	This is a reflexive process and the abstracts are used throughout the analysis to illustrate codes and themes

Monger had transcribed the original thinking aloud audio recordings, which were recorded whilst the participant watched the videos. These were listened to and checked for accuracy with some gaps filled. Listening to these evoked ideas about the original event and context in which they were recorded, providing substance to the written word, this also ensured that the recordings were available to be revisited, checked and verified. Monger did not transcribe the semi-structured interviews therefore I transcribed them verbatim, ensuring that the purpose of the speech, as well as the context, was captured for permanence (Lapadat, 2000). Each interview and utterance from the observation of the videos was transcribed in order to capture the narrative flow and line-by-line looking for themes and instances, an approach advocated by Atkinson (1995).

4.6.1 Coding the Verbal Data

The process of coding the data started with immersion in the data, watching the videos (with playback eye movement enabled) and listening to the viewers' utterances, writing notes, and then reading the transcripts from the semi-structured interviews. Immersing myself in the data and going back and forth between the data from individual participants and the sources, allowed for codes and themes to emerge and develop as similarities and differences were noted. During this time consideration was given to how each piece of data could be used and weighted in drawing the conclusions.

Questions asked of the data included:

- What is the person saying?
    - Words used
    - Language used
- What is the performative function?
- What is the intent of the words?
- What is the overall perception of what is being said?
- How does what is being said relate to the task?
- Are there commonalities and differences between the viewers and within their own utterances?

As the data had already been collected, consideration was given in relation to the task that the participants were given and the methods associated with the verbal data. This provided the context and contextualised the participant's role. During the semi-structured interviews the participants were asked about the students' overall competence after watching the video. Each of the semi-structured interview transcripts was considered as a whole and as individual comments, looking for the key themes and judgements. Initial notes and thoughts about what the participant was saying were recorded in a table to help with note taking and coding, and this process was repeated for all three of the semi-structured interviews, with an example shown in Table 15 . After careful consideration and moving backwards and forwards between the transcripts it appeared that a key issue was how the participants interpreted what they had seen and how they verbalised this.

The next step was to consider the transcripts of the viewers' utterances. This allowed for immersion in the data and an opportunity to hear the utterances in the context in which they were made. The rich data of linguistic analysis is not considered here, although it is difficult to not take an impression away of what is being said and how, through the tone and intonation. At the

time the significance of this was not evident, however it later became a pivotal part of the analysis.

Table 15: Example of the transcription of a participant's utterances whilst watching the video with initial coding (Participant D)

Time	No.	Transcription (and signifiers)	Exploratory What do I think?	Codes
0150	1	I don't like the way she's stood back with her hands in her pockets	*Judging behaviour* *Commenting on professionalism and infection control* *Negative comment* *Hands in pockets is not an acceptable posture. It indicates disinterest and or rudeness. Student could be doing it out of comfortableness as the scenario has just started.*	Self - Infection control - Behaviour -

The videos were watched again, and careful attention was paid to ensuring that the transcription was an accurate representation of the viewer's utterances. Each of the transcripts was then considered and initial notes made. Table 15 shows an example of how the utterances were transcribed and coded with the negative and positive intention in the final column. This approach proved useful in clearly seeing what had been said and the interpretation made.

Each of the transcriptions of the three thinking aloud commentaries (utterances) were read and the videos watched, during which time codes began to emerge based on what had been said by the viewer and the interpretation of their words and meanings. This process was developed iteratively, and was refined by watching each of the videos three times, which enabled a sound understanding of what the viewer was saying and how it applied to the video. During this process it occurred to me that what was being said fitted within the NMC's four domains of competence (NMC, 2010); therefore, the transcripts were revisited to test and then apply this via coding. The use of colour facilitated this process and is shown in Table 16.

Table 16 Themes and coding of the verbal data

Superordinate themes POSITIVE NEGATIVE			
Professional *Yellow*	**Communication and interpersonal skills** *Green*	**Nursing practice and decision making** *Blue*	**Leadership management and team working** *Pink*
Self Behaviour Simulation Boundaries	Interaction with patient Communication with patient Communication between selves	Infection control Identification of cues Interpretation of cues Management of cues Ordering of actions Clinical skill	Team work Leadership Power Positioning

Each of the codes was attached to a theme and the data considered again in order to determine if all the comments were coded and accounted for. These themes have not necessarily used words from the comments as suggested by Smith et al. (2009), but draw on the notes and codes with the researcher's interpretation of what is being said. This draws on the principle of making meaning from the lived experience associated with hermeneutics (van Manen, 2014).

Superordinate themes were then decided upon, as the comments were either signifying behaviour, which were deemed negative or positive in relation to the achievement of competence. One example is in the comment made by Participant E (comment 15) *"…they have identified that a doctor is needed…"* This has been coded as boundary and under the theme of professional values, with the superordinate theme as positive. The viewer appears to be using the sentence to perform the action of positive reinforcement, as the students have recognised the limits of their ability and knowledge, and have acted on that. Each of the transcripts for the participants' utterances was coded in this manner and an example of how this was performed is shown in Table 17, with a complete version for participant D presented in Appendix E.

Table 17: Example of transcription with colour coding and superordinate themes applied (Participant D)

Time	**No.**	**Transcription (and signifiers)**	**Exploratory** **In bold = need to see video to make sense of**	**Codes**
0150	1	I don't like the way she's stood back with her hands in her pockets	*Judging behaviour* *Commenting on professionalism and infection control* *Negative comment* *Hands in pockets is not an acceptable posture. It indicates disinterest and or rudeness.* *Student could be doing it out of comfortableness as the scenario has just started.*	Self - Infection control - Behaviour -

4.6.2 Combining the Data for Triangulation

The final stage of analysis was to bring the data together, initially considering all of the data from one participant together, and then all of one data set, looking for areas of commonality and difference in order to draw further conclusions. The data were considered for each of the participants and then for each type of data with both within and between approaches used to gather as much information as possible in order to draw conclusions. This approach enables both the cognitive and perceptive elements of the viewers' visual attention to be considered. Taking each segment's data from the verbal utterances and the eye movement allows the interaction and interpretation of the data to be questioned and further developed.

To ensure rigour in the analysis of the data sets, each stage was carefully considered and documented. Seale and Silvermans (1997) suggestions for sense checking, counting and coding were all applied with Monger both supervisors independently reviewing the themes and coding. The extensive use of the participants voice and eye movement adds confidence to the rigour of the analysis allowing the reader to see the process. Triangulation of the results is revisited in subsequent chapters to demonstrate how this has been achieved.

4.7 Chapter Conclusions

The analysis of the data gathered from Monger's study demanded that the methods be sufficiently sophisticated to identify the multiple voices. The methods presented in this chapter have been brought together to create a novel framework of analysis; gaze-to-text. This framework of analysis draws on the methods discussed in this chapter, taking each element and exploring the meaning through the analysis of eye movement and verbal utterances. Chapter 5 presents the findings from this phase of the study.

Chapter 5 - Phase One Findings

5.1 Chapter Introduction

This chapter consists of two main components: (1) the results of the analysis of the data; and (2) the further development of the conceptual framework. Beginning with an analysis of the verbal data and applying the performative functions and coding established in the previous chapter, it moves to consider eye movement and turning the gaze-to-text, before combing the two data sources to draw conclusions on both the tools and the findings. The results of the analysis set out in Chapter 4 are presented drawing on the participants' own eye movements, verbal utterances and semi-structured interviews to allow the reader to negotiate the text and create their own.

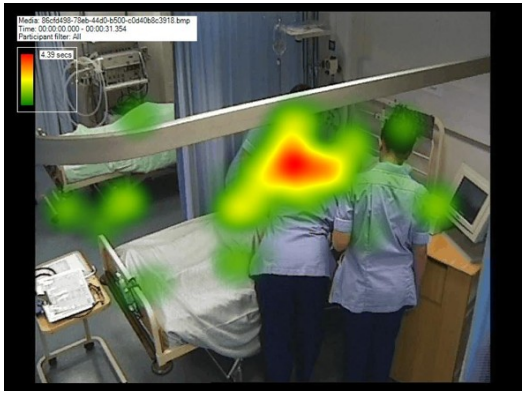
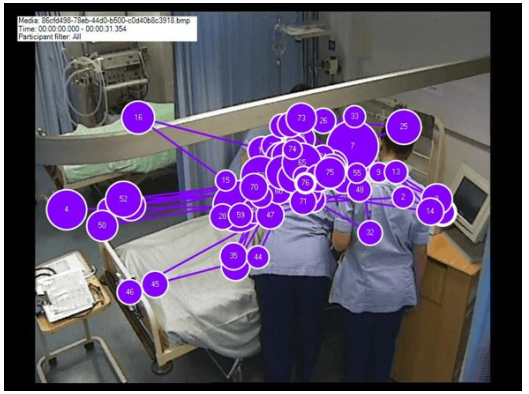
5.2 Analysis of Eye Movement

In the discussion on the analysis of the data in Chapter 4, four segments were identified for in-depth analysis, which were identified as opportunities for the feasibility of the planned data analysis to be considered and tested. Each of the segments is discussed in the following sections.

5.2.1 Moments when All the Participants are Commenting

The first segment was based on a point in the video where all the participants commented. During this video three students are with the patient whilst one student is on the phone (off screen, then returning and leaving again); the student on the phone is speaking to the doctor giving a handover and asking for a review. All three of the viewers made comments during this time and whilst the performative function of all is the same, i.e. the students are not performing to the level expected of the viewer, but the way that this is communicated is different. The verbal data during this time indicates that each viewer have seen behaviours which have led them to make these utterances and viewing their eye movement allows for further insight. The eye movement and verbal utterances are presented in Table 18 which facilitated the analysis, as it not only allowed for a comparison of each data set but was the beginning of the framework that resulted in the gaze-to-text.

Table 18: Eye movements of all three participants during segment where all are speaking

Comment from participant D: "*She's pushed the other student out of the way there, she wanted to get there and she's not doing anything"* Heatmap Saccades and fixations (shown below)	Comment from participant E: *"He's saying all the right things, he gave a bit of history of the patient, so the doctor knows why they are in hospital"*	Comment from participant H: *"That was inappropriate to shout across the ward about the wound site. They need to use a more structured communication tool."*
		
		

Whilst watching the eye movement and taking notes it is possible to compare the three participants' eye movement, which showed that all concentrated on similar areas although the patterns differ. During this segment the student off screen, speaking to the doctor on the phone, is clearly heard, together with some communication between the students at the bedside offering information.

During this time participant D concentrated their attention initially on the student who is talking to the patient on the far side of the bed (not shown in the screenshot), and then moved their attention to the students on the near side of the bed as they move around and start questioning the patient (one student moves the other out of the way at this point). The eye movement during this period reveals that participant D is following the action of the students, with larger fixations evident within the concentrated eye gaze.

Participant E's eye movement shows a different pattern, with attention spread across more of the screen. Through their eye movement it is clear to see that they follow the student from the far side to the near side, and although the fixations are much smaller in comparison to participants D and H, they are looking at the same thing. Participant E is less experienced that the other two participants and this form of eye movement is indicative of someone who is not sure of what is important and is trying to take it all in. The heat map shows that the attention throughout this segment is on a very similar location to that of the other participants but the composition (seen in the saccades and fixations) is different.

Participant H also starts with the student on the far side of the bed and follows them around when they move to speak to the patient. The clustering of fixations over a similar location to the other two participants indicates that they are concentrating on the action, but there are outlier fixations at the end of this segment when participant H is speaking. Participant H referred to the student talking on the phone and not in the shot at this time, and the utterance is at the point when these fixations are created. This is suggestive that participant H is not requiring the visual information from the screen to make the comment and that therefore their eye movement has drifted from the scene of action.

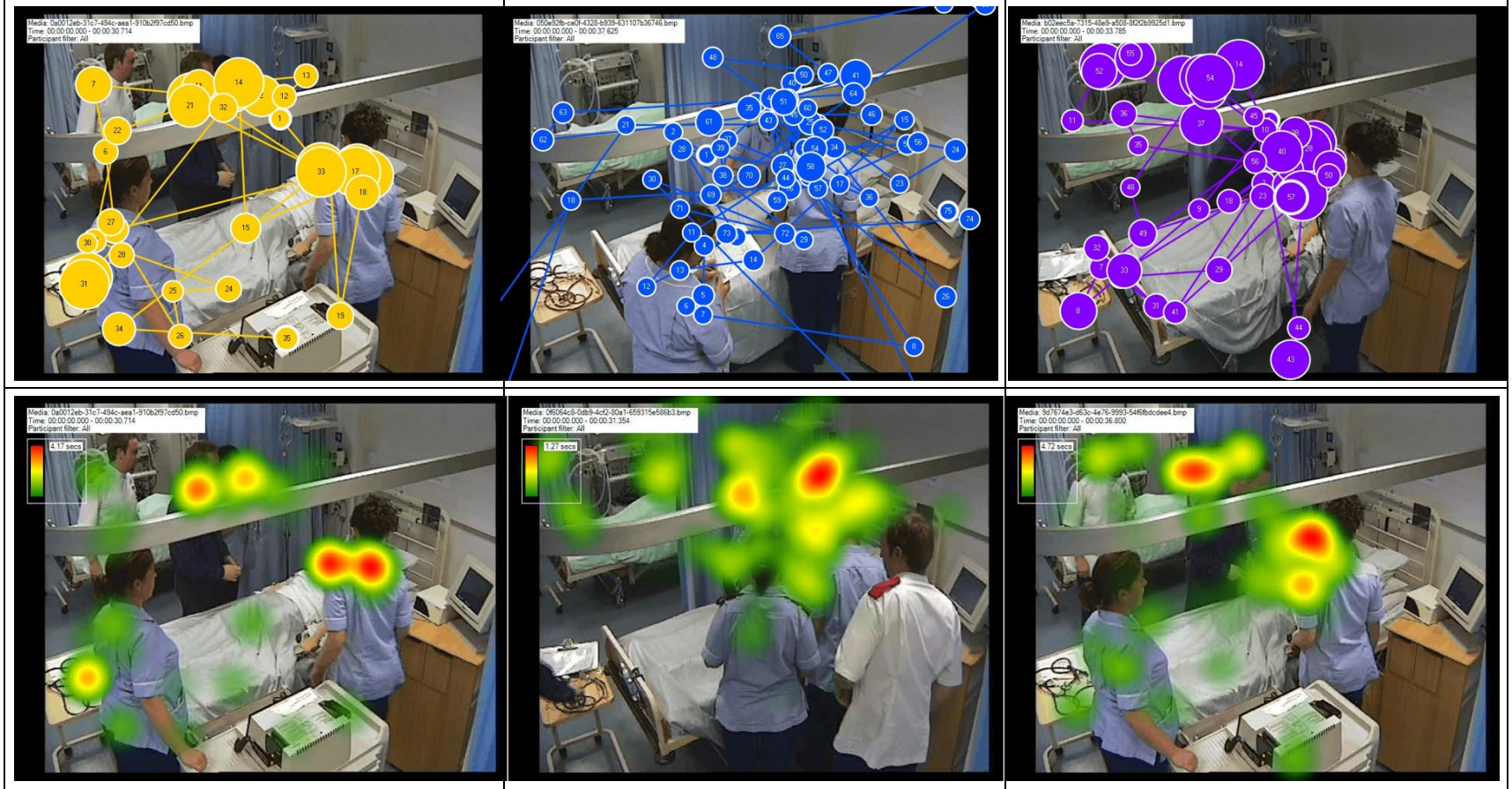
When considering the segment in this manner it is possible to see what has drawn the attention of the viewers and make assumptions about what they are looking at and why. Interestingly, only participant D made a comment on what was happening in the shot commenting on the action, whilst participants E and H commented on what they were hearing and was off screen. This may indicate that there is a lag in the seeing and speaking, as there are similarities in what the participants comment on around this time but at varying intervals. Alternatively, it may indicate

thinking or processing time for the viewers. For instance, after the segment has finished participant D (0930) says *"yes the patient's normally hypertensive"* in response to the student giving another blood pressure reading to handover to the doctor. This is a key indicator of the patient's condition and participant D is using their clinical knowledge to frame their response. Whilst they have not directly commented on the handover, this utterance indicates that they are engaged with what is happening.

5.2.2 Moment when No One is Commenting

During the 30-second segment when none of the participants made a comment, the students are moving around the bed and preparing the area for further action, i.e. bringing in the emergency trolley and moving the table out of the way for safety. During this time no one comments but what are they looking at? Could seeing what they see explain the silence? To explore this section AOIs were created on each of the three videos using the same time stamp and carefully drawing them with clear points of reference to allow for comparison. Table 19 shows the participants' eye movements in the form of saccades, fixations and heat maps.

Table 19: Eye movement of all three participants when no one is speaking

Participant D	Participant E	Participant H
		

During this time the doctor is speaking and giving instructions to the students, and it appears that the participants are watching and listening in order to satisfy their own curiosity and/or to gather the benchmark on which they will test the students' competence by their action. Participant D follows the doctor's movements from entering the screen and has the largest fixations over the doctor as he is speaking to the student who remains on the near side of the bed and provides information to the doctor. Participant D does make a comment just as the doctor arrives, but it is not possible to hear what is said (this segment starts just after this comment). They next make a comment just after the scene finishes *"the one by the resus trolley is staying calm",* and it is clear that there have been fixations on this student with saccade movement between them and others. During this time participant D is showing eye movement characteristic of information gathering and theory building, with movement between key areas (doctor, student in action, monitor and emergency trolley). This is a very similar pattern to the eye movement of participant H, and the eye movement of both is indicative of a top-down approach to hypothesis creation (Barton et al., 2006). Participant E is again showing small fixations and lengthy saccades that is indicative of someone whom is unsure of what is important to fixate on and is therefore scanning everything within the scene. Participant E does also focus on the doctor when he is talking and the majority of the time, as shown in the heat map, is focused on the point where the doctor spends most of the screen time positioned, but the eye movement differs greatly from the other two. Participant E comments nearly two minutes after this scene finishes saying *"I'm quite worried about that girl's ability",* one of the comments that was used for the analysis.

5.2.3 Segment One from the Perspective of Participant H

Segment 1 is taken from participant H's perspective and is based around a key comment: "*Jobs need to be assigned here, there needs to be more leadership here."* At this point in the video the doctor has arrived and is talking to the patient, while the students have retrieved the emergency trolley with the defibrillator, visible at the bottom of the frame. This segment was chosen as the participant is clearly identifying that what is happening is not to the standard that they would expect, but what is H looking at when this comment is made? The comment is recorded at 1222 and the segment started at this point and ended at 1230 as students leave the frame. When watching the video there seems to be some confusion between the students as to what is happening and what should happen; there is a lot of movement of the students but little action, and in Participant H's opinion little leadership. However, the question is what is participant H looking at when this is said and does this segment add anything to the understanding of the performative function of the comment? With a possible lag in seeing and saying, this segment may prove too short, is participant H stating a fact in the moment or is this the culmination of

events up to this point? From the heat map it is clear to see that there is a point within the segment where participant H has looked at more than others have. What cannot be seen under the heat map is that the student stood there is holding nasal oxygen delivery tubing but why does participant H appear to spend so much time here? Questions are then raised as to how does participant H interpret 'leadership'? Is the oxygen tubing a symbol of power imbuing the holder or is it the position of this student that is of interest? The position of the student at the end of the bed is a classic position that allows for surveillance of the entire scene, and is one which is encouraged in advanced life support courses as the position for the leader.

As seen in Figure 16 and Figure 17 (AOIs shown in Figure 15), the focus of the participant's viewing is on an area that has not been pre-defined as an AOI by the researcher. The question here is therefore what are they looking at? There is nothing there, and it may be that they are not actively focusing or that they are taking a moment to reflect and process. The statistical analysis of fixations and saccades (between AOIs) is limited in this instance, as the descriptive statistics shown in Table 20 are focused on the mean length of fixations on the AOIs. These are shown here to illustrate the complexity of creating and defining AOIs and how the validity of the statistical analysis is dependent upon the pre-defining of AOIs. Table 20 shows the length of fixations on the defined AOIs, along with the length of fixations not spent on the AOIs. When using such statistics on one viewer the full benefit of such an approach is not maximised, although they do support the conclusions drawn from viewing the video with saccades, fixations and heat mapping applied. The statistics shown in Table 20 indicate the length of time the viewer spent fixating on the AOI, which is as a whole over the segment and does not indicate the ordering or the number of fixations, as this information is not available when using Tobii TX. This information is therefore of limited use as it does not indicate when the viewer was looking and fixating on one AOI and what was happening at that time.

Figure 15: AOIs on segment 1

Figure 16: Fixations and saccades on segment one from participant H

Figure 17: Heat map on segment one from participant H

Table 20: Descriptive statistics for segment one for participant H focused on fixation length

	Number	Time (seconds)	Percentage of time
Not on AOI	1	13.774	46.294
AOI 1 Fixation Length	1	2.14900	8.1302
AOI 2 Fixation Length	1	2.23200	7.5017
AOI 3 Fixation Length	1	5.18800	17.436.
AOI 4 Fixation Length	1	3.87900	13.037.
AOI 5 Fixation Length	1	0.28300	0.9511.
AOI 6 Fixation Length	1	2.24800	7.555.
Mean (time seconds)	**4.25**		
Standard deviation	4.45482		

5.2.4 Segment Two from the Perspective of Participant E

Segment 2 is based around an utterance where a judgement about an individual is being made but who is not identified in the utterance. At this point in the simulation the doctor has been called and the patient is being assessed. Whilst watching the video the participant E commented: *"I'm worried about that girl's ability."* From viewing the heat map it appears that the student within AOI 1 is being spoken about, and the use of eye tracking means that it is possible to see what the participant or viewer is looking at. This reduces the risk of inaccurate interpretation and strengthens the case for using a visual means of analysis. As seen in Figure 19 and Figure 20 (AOIs shown in Figure 18), the participant is looking above the head of the student in AOI three, but as the gaze is not being identified within the defined AOI the statistical analysis does not demonstrate that this is the person being referred to. However, when looking at the largest fixation on the screen (labelled 41), which is at the end of the segment, it is clear that this student has taken the interest of the viewer.

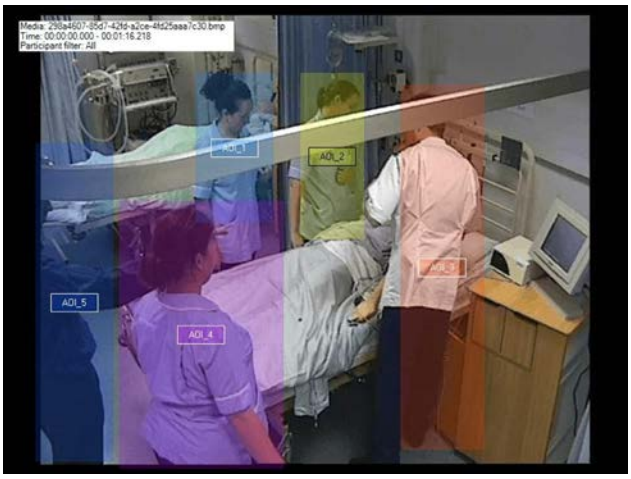


Figure 18: AOIs on segment two

Figure 19: Saccades and fixations from segment two for participant E

Figure 20: Heat map from segment two for participant E

Table 21: Descriptive statistics from segment two for participant E

	Number	Time (seconds)	Percentage of time
AOI 1 Time to first fixation	1	11.15000	44.664
AOI 1 Fixation Length	1	2.14900	8.608
AOI 1 First fixation duration	1	0.25000	1.001
AOI 1 Fixation Count	1	5.00000	20.028
AOI 1 Observation Length	1	2.41500	24.964
AOI1 Observation Count	1	4.00000	16.023
Mean (time seconds)	3.9199		
Standard deviation	**3.52148**		

Time to first fixation, as shown in Table 21, may suggest that the viewer is making comparisons with others before attending to this one. Watching the playback of this segment this appears to be the case, with the participant going back and forth between this student and others. When considering the statistics, it is important to note that the heat maps and saccades are shown over the whole screen and not just the AOIs; the interpretation of the statistics when using a video as stimulus needs to be done within the context presented here. Whilst the statistical analysis is of use, the saccades and heat map shown in Figure 18 and Figure 19 are of more use in determining what the participant has looked at, when and for how long. This is due to the limited data set that can be subjected to statistical analysis due to the movement within each frame of the video, which combines to create segments and scenes. With a larger data set descriptive statistics may be useful in comparing what viewers have fixated on, for how long, and how many times; however this supports a more ethnographic approach to the use of eye tracking in this context.

5.2.5 Seeing the Unspoken: Eye Movement

Viewing the scan pathways overlaying the video led to other observations being made which would not have been identified otherwise. In Figure 21 it appears that participant D is performing the same 'sweeping observation' behaviour associated with the situation. Here the doctor has the defibrillation pads on the patient's chest and is about to perform the cardioversion. The standard safety practice at this point is for the person with the defibrillator (in this case the doctor) to say 'stand clear' and undertake a visual sweep of the area. This is to make sure that no one is in contact with the patient or anything connected to the patient who may also receive the shock. The final check of the monitor is to ensure that the electrocardiogram is showing a 'shockable' rhythm. The screen shot showing the scan pathway starts at the defibrillator and then moves around all of the students and ends with attention on the monitor. This screen shot is taken at 1525 and the comments around this are at 1410, *"The other one is still stood there just doing nothing",* and at 1530 (after the cardioversion has taken place), *"She put the oxygen back on"*.

Neither of these comments would indicate that the scan pathway has taken place. However, without asking the participants to view this and provide their own interpretation of the scan pathway it is only a supposition that this is taking place.

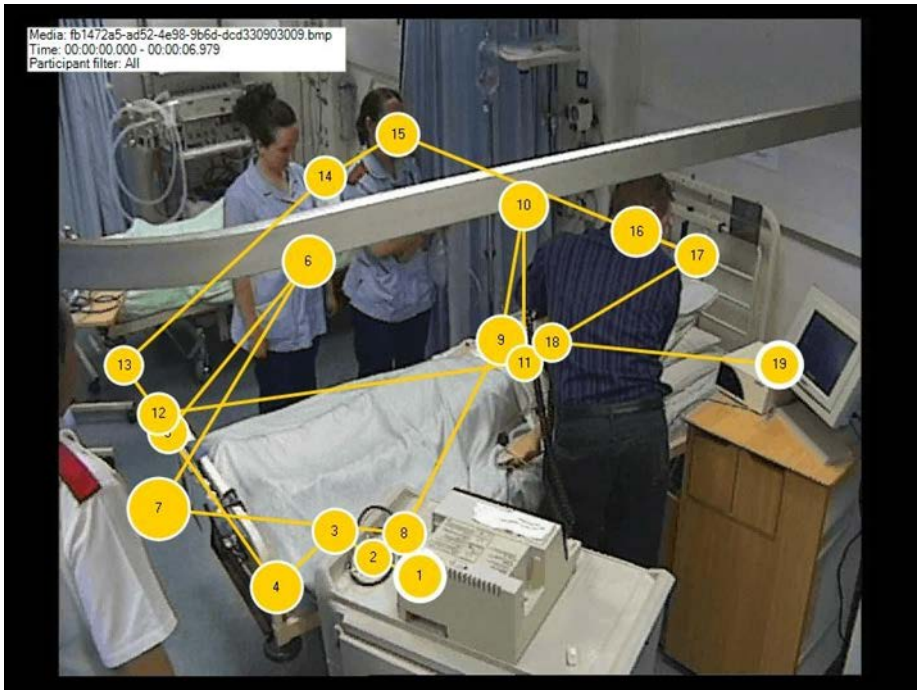


Figure 21: Scan pathway from participant D

In this example the eye movement of the participant is turned into text, describing the movement of the eyes over the action occurring. The numbers within the circle indicate the ordering of fixations. This interpretation and development of text is based on the participant's background (critical care nursing) and it is a reasonable supposition that they have been involved in such situations and had associated training. This may be a chance finding or it may be a visual representation of the gaze, without the participant reflecting and offering an explanation the interpretation is that of the author's; however, this scan pathway is illustrative of the gaze pattern and how the unspoken can be seen.

The same period was viewed for the other two participants and is shown in Figure 22 and Figure 23. It is clear from watching them and capturing their eye movement in these images that they are both gathering information from looking at the same things, but again participant E is showing longer saccades and short fixations in comparison to the other two participants. There does appear to be an element of checking for safety but the ordering of the saccades and fixations does not indicate that this was done in the manner of participant D. Participant H has longer fixations and there appears to be more order in their eye movement moving between the doctor and students (fixations 13-23) but the 'safety sweep' is not present. This does not negate the conclusion drawn from participant D's eye movement but does demonstrate that eye movement

during this moment is worth consideration and that it offers insight which would not be offered through verbal utterances alone. Traditional methods of analysis drawing on the statistical software would also not have allowed for this to be seen.

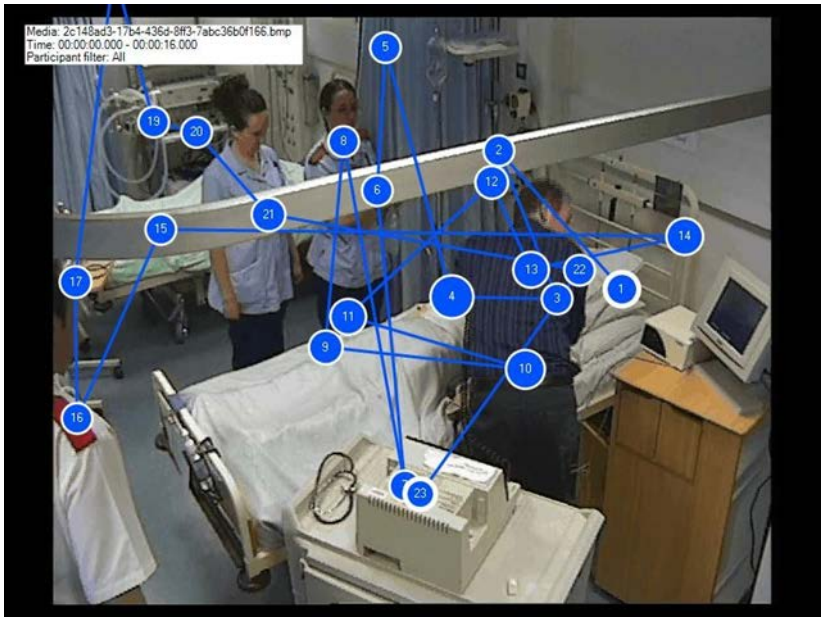


Figure 22: Screenshot from participant E watching the cardioversion

Figure 23: Screenshot from participant H watching the cardioversion

5.3 Analysis of the Verbal Data

The viewers were tasked with considering the students' level of competence. To enable analysis of the indicators of competence, Monger (2014) identified comments that signified behaviours associated with competence within the video utterances for each viewer. Identifying the signifier

comments was a useful tool in developing the coding themes and determining which themes required reporting on. Based on the task that the viewers were given, the comments have been viewed as performing the task of signalling behaviours regarding the level of competence of the students within the video.

The terms negative and positive are used here to indicate the performative function, whether what they are seeing is interpreted as the right behaviour or one, which indicates a degree of competency [positive], or whether what they are seeing is interpreted as wrong or inappropriate behaviour [negative]. Here behaviour includes speech, positioning and action, and Table 22 shows the total number of comments that have been coded as signifying negative or positive behaviours by the participants. This approach allowed for a clear check and comparison of the comments between participants, with the findings supported by the overall judgement made of the students by the participants in the semi-structured interviews.

Table 22: Comments made by the viewers whilst watching the video

Participant	Total comments	Signifying 'negative'	Signifying 'positive'	Signifying 'positive' and 'negative'	Unclear what is being signified	Not recorded
D	21	8	10	0	1	0
E	31	17	9	1	1	1
H	65	55	5	2	2	1

When considering the verbal data it was clear that the signifiers required careful consideration as the performative function of the utterances was key to understanding and interpreting the nursing gaze. Drawing on the work of Austin (1962) and his speech act theory, a set of performative utterances were developed which were then applied to the data, which are presented in Figure 24.

Negative
Statement of fact *'They have…'*
Direct approach filling in the gaps *'They should have…'*
Correctional/improvement comment *'He really needs to…'*
Interventional action *'I would need to…'*
Supposition *'She hasn't seemed to…'*
Judgement *'She's not aware…'*
Positive
Confirmation of the behaviour *'I like the way…'*
Statement of fact *'He's picked up on it…'*

Figure 24: Performative functions developed from the analysis of the verbal data and based on the premise of Austin's performative utterance

These are applied to the data in the subsequent sections, and whilst each may be used in the context of performing both signifying negative and positive intention, they are presented in the manner in which they were identified in the data. These are all judgements, although judgement is also used as a signifier dependent upon the felicity conditions.

5.3.1 Signifying the 'Negative'

Each of the three participants signified that they were seeing and/or judging behaviours that they deemed negative and not indicative of competence. The manner in which they indicated this differed, although the performative function remained the same. Examples from the transcription of the utterances are shown below.

Statement of fact

D6: *She's pushed the other student out of the way there, she wanted to get there and she's not doing anything*

E3: *I haven't seen them looking at the notes or look at, not looking at the patient*

E5: *1 has got their hands in their pockets*

H3: *Uhhh male nurse hand in pockets would not happy with that*

H14: *No-one is addressing the patient's main concern, which is that she wants a cup of tea*

H55: *They've put their hands all over the equipment in the crash trolley, having not cleaned them end stage*

Direct approach filling in the gaps: 'they should have…'

E22: *So these two that are left should be doing the ECG now*

E29: *Before the Doctor left they should have asked for a plan, I suppose the next stage would be specialist care*

H15: *Could have asked about the blood pressure in a more professional way, explained why.*

Correctional/improvement comment: 'he really needs to…'

H12: *He really needs to leave his pockets alone*

H39: *They need to use a more structured communication tool*

H43: *They need to be escalating this*

Interventional action: 'I would need to intervene…'

E12: *If I was her mentor I would probably get her involved in umm taking a bay obviously with talking through what she would do with patient, if they were her patients may be start with thinking about it on her own getting here to think about what others are doing and the moment she seems to be happy that they are doing the work.*

H52: *I would need to intervene here, they need more help and medical support*

Supposition: 'She hasn't seemed to…'

D19: *She hasn't seemed to be assessing the patient in the same way as the others*

E 11: *I think that the girl that's stood by the screen umm she seems to feel, I don't think she feels that at ease with the simulation*

Questioning: 'What's she doing there?'

H65: *Was that sort of a handover?*

Each has a performative function signalling to the audience (in this case the researcher) that what is being seen is not meeting the standard or expectation of the viewer. The manner in which they are stated may change, but in the context they are performing the same action.

5.3.2 Signifying the 'Positive'

A similar approach is seen when positive indicators are verbalised, although there are less than the negative indicators, with the number of negative utterances potentially being due to negative leaning (Ito et al., 1998; Hilgard et al., 2014).

Confirmation the behaviour: 'I like the way…'

E6: *I like the way that they've attempted to maintain her dignity by obviously drawing the curtains.*

E10: *Good practice she continues to talk to the patient, which they are doing and reassuring her*

H6: *Gained consent for the pulse again*

Statement of fact: 'He's picked up on it…'

D2: *He's picked up on it being irregular*

Judgement: '…she's aware'

D5: *She seems to be asking the right questions about the patient how she's feeling, she's doing those other little things that we do to get ???*

D17: *The one by the monitor, she paying attention she's aware of the whole thing*

5.3.3 Qualifying Comments

At times the viewers made comments that either appeared to excuse behaviours or include both positive and negative signals, giving felicity conditions. This is present in both the utterances from the video and in the semi-structured interviews. In participant H's utterance comment 30, they identify a negative behaviour *"there's a lot of stood staring looking at what the person is doing…"* which is then placed into the context of the simulation and excused using contextual or situational reasoning *"…although I do accept that it's a mannequin"*. In the semi-structured interview participant H again identified this in the opening comments (lines 2 and 3) *"… I am more used to simulated practice than some people are so I understand that that's an unusual environment for them to be in …"*

Recognition that this is a simulated environment appears to change the perception and application of the standards being applied by the participants to the students' degree of competence, thereby suggesting that competence is context dependent for the participants.

Participant D does not comment on the simulation element during the utterances whilst watching the video, but in the semi-structured interview suggests that this may be affecting the student they felt not to be performing:

> *"…this one was just hopeless, she, I don't know it may be simulation and she was uncomfortable but she was just she was just hopping around the bed from foot to foot. It looked like she was trying to look busy but wasn't and the patient would be talking and*

wasn't looking at them. She moved her head around almost like she thought she should be looking at things but she didn't actually look at any of the right things. I felt she was just hopping around trying to look useful, I don't think she touched the patient barely there were things going on and I suddenly thought what she didn't seem to respond to what was going on."

Semi-structured interview participant D, lines 29-32

Participant E makes two comments involving the simulation in the utterances on the video, one qualifying the behaviour seen, although this is not revisited in the semi-structured interview.

"I think that the girl that's stood by the screen umm she seems to feel, I don't think she feel at ease with the simulation."

Utterance from participant E, comment 11

These are interpretations of what the viewer is saying, and to ensure validity the semi-structured interviews were examined. It is evident that each of the participants had made judgements about what they had seen and the degree of competence demonstrated. All three participants appear to have differing views on what they have seen and have their own expectations and ideas as to what is acceptable and what identifies competence. Monger (2014) identified areas of congruence, drawing on the data from all of the participants and considered this in relation to the tacit understanding of competence. Whilst the analysis of the data here again highlights that there are certain indicators the participants are concerned with, their comments are often ill defined or a 'feeling'. However, there is congruence with the same performative function being used, indicating the judgement of the participant to the researcher.

5.3.4 Judgements

Whilst watching the video each of the participants talks aloud, verbalising their thoughts, and when considered in the context of the semi-structured interviews, the participants' judgements with regards to what they have seen becomes clear. All three participants signalled that what they were seeing in the video was not always achieving what they considered competent although the way in which they said this differed, and the level to which their expectations met can be seen in the semi-structured interviews.

Participant D made 21 comments whilst watching the video; eight were coded as negative and ten as positive. In the final summary during the semi-structured interview this balance seems to have been applied again. Participant D offers comments and examples illustrating their judgement. While there may be no overt discussion of competence, to the right person this situation is telling, *"She's clearing up after the others, taking things off the floor."*

Utterance from D comment 16

The message is being delivered to a receiver who can identify this signal and interpret its performative nature, or at least apply an interpretation based on what is said and the researcher's own clinical experience. In the situation where D is commenting, the patient's airway is compromised and one of the first things that should be done is the bed pulled out and the pillows taken out from under the patient's head to facilitate an open airway. The pillows should be placed out of the way for safety reasons, but in the video one of the student throws the first to the floor, and without speaking another student picks it up and moves it. When the student goes to throw a second on the floor the student again intervenes and takes it directly from them. This indicates that the student who has moved the pillows is aware of the need for safety and that it is an important role. Participant D also commented on this in an utterance whilst watching the video, which clearly indicated that it was important to them.

> *"And she was standing back a bit and taking a bit of stock of the whole situation, she wasn't going to let him put his pillows on the floor she gave the other one the defib, she just seemed more in control of the entire situation. These two I'd put fairly evenly but they were both fairly focused on their patient and they seemed to be looking fairly appropriately picking up on things using the obs machine you know the monitor to take obs seemed to be getting it right this one was just hopeless she, I don't know it may be simulation and she was uncomfortable but she was just she was just hopping around the bed from foot to foot it looked like she was trying to look busy but wasn't and the patient would be talking and wasn't looking at them, she moved her head around almost like she thought she should be looking at things but she didn't actually look at any of the right things I felt she was just hopping around trying to look useful I don't think she touched the patient barely there were things going on and I suddenly thought what she didn't seem to respond to what was going on."*
>
> Semi-structured interview participant D, lines 19-32

Here participant D is commenting on the students, identifying each student individually and making comments on what they have seen and providing a judgement. Participant D uses examples of positioning and action to signal judgement, interpreting behaviours such as looking at the monitor and taking pillows off the floor to illustrate their final judgement. Participant D does not refer to any of the student's degree of competence, rather they refer to two students who participant D felt were achieving what was needed, demonstrated by their focus on the patient and identifying cues in comparison to the other two students. Behaviours being exhibited by the students are the focus and the performative function is the level of competence which the students attain.

Participant E identifies the same students as being of a higher standard than the others are, although when asked about the students' overall competence participant E answers:

> *"I feel really confident about 3 of them um because initially it was only 2 of them because 1 of the girls took a little while to get involved but she did and in fact she really started to take the lead towards the end but there's 1 girl in there that I would really not confident enough to pass her just based on this."*
>
> Semi-structured interview participant E, lines 14-37

Participant E is using the example of leadership in their justification of the judgement made. The main performative function of what is being implied is the same but the example is different. The student that participant E does not feel confident to pass is referred to later in the semi-structured interview, and an explanation of this feeling is provided:

> *"The whole way through she didn't do anything. I just thought that it was going to be a confidence issues at first and to get used to simulation and to sort of get into it but she didn't, she didn't overcome that and she was quite happy to stay in that 1 spot apart from when Chris [doctor] came in and started to umm what went wrong then he cardioverted her and then the patient and then obviously wanted a bit of background history and the person who hadn't done anything volunteered to talk to him about history but how do you know if you haven't done anything?"*
>
> Semi-structured interview participant E, lines 27-34

When viewing the video and the transcript of the utterances, participant E has mixed reports commenting on both negative and positive behaviours that correlates with the final judgements given in the semi-structured interview. This may be in part because participant E has used prior knowledge of the students' levels:

> *"Yeah, I think three of those students were, I thought they were not only higher [this is the second video E has seen] not only because they were wearing their red epaulette but I thought they were in a higher year than the other girls, I thought the other group seemed to be may be start of the second year but this group, I don't know if it's because they are a little bit older, seemed more confident."*
>
> Semi-structured interview participant E, lines 37-41

Here participant E is using not only prior knowledge, that red epaulettes indicate a student is in their final year, but is also comparing to the previous video seen. Participant E is applying unwritten rules to competence and what this looks like. Drawing on the expectation and supposition that with age comes confidence, and from watching the video this appears a true reflection of their ability.

This is also evident when participant H is asked about their perception of the students' competence. Initially, participant H is very negative in their assessment, immediately opening the semi-structured interview with an answer that contains many elements. Participant H is asked 'so how did you find the video?' and answers:

> *"Yeah, it was interesting I am more used to simulated practice than some people are so I understand that that's an unusual environment for them initially um my general observations were very poor use of the hand cleaner which became a real bug bear of mine in the end they kept interfering with that ladies wound and catheter there was a weak leadership, I wasn't clear who of those four nurses was actually leading his, there was an awful lot of hands in pockets and at one point I need to go back to the hand cleaning but she was scratching her armpit under the uniform and umm I also felt that there should have been challenging, the handover to the doctor wasn't great."*
>
> Semi-structured interview participant H, lines 3-10

Within this answer participant H is referring to behaviours that have been coded in each of the four domains related to competence according to the NMC (2010) and used here to illustrate the coding scheme employed. With little prompting participant H is providing a mass of information about their assessment of the behaviours they have seen and how they have judged them. Participant H is confirming the themes and signifiers that they have raised when verbalising their thoughts watching the video, and again participant H is signalling behaviours, providing examples where competence has been possible but not achieved. This is a pattern within the interview with participant H drawing on examples from the video to explain and explore their opinions; participant H is drawing on their own perception and understanding of competence and is applying this standard. It does not appear from the transcript that participant H is aware of the red epaulettes and is therefore not using this as a guide to the students' level, as when asked participant H provides an answer where it becomes clear that the student's level is a surprise:

EM: *Any of them stand out? Particularly…*

H: *Competent?*

EM: *As being competent or incompetent?*

H: *I don't think I mean I don't know what level what year they are in*

EM: *What year do you think they are in?*

H: *I would hope, that they're in year, I would have thought year 2*

E: *They're actually third years*

H: *Really? Umm [phone] sorry [STATIC] they didn't stand out as being*

H: *incompetent there was evidence certainly with these three that what they were doing*

H: *was underpinned with existing knowledge but that was quite theoretical*

Semi-structured interview participant H, lines 50-59

Participant H has used experience to apply a level at which they are expecting the students to be, and is saying here that the behaviours and actions being displayed are of those of year two (middle year) students. Participant H does not quantify what is meant, but this is indicated by the actions that the students perform, such as attempting to open the airway to take observations etc. They were correct, but they lacked an overt demonstration that they knew what they were doing and why. In the semi-structured interview participant H identifies that there are elements there but that they need 'work'. In the comment below participant H uses the example of the information given to the doctor after the cardioversion. In practice this should have been given before the cardioversion to ensure that the doctor has the information required to maintain patient safety. However here, as the doctor has not asked for it, the students have not given it, possibly because they did not know it was needed or they may not have had the confidence to interrupt the doctor.

> *"Umm which propagated the probably slightly incompetent way in which they then dealt with the doctor when he arrived but you could argue that because he lacked the right information that was agitating him. Umm I would also that they I wasn't happy that they were with when it came to drawing up drugs umm there was no questioning of this again poor technique in not using gloves not cleaning his hands first no one checked the medication with the doctor and they allowed him to give it they, this, if this was in a real environment they would have to be intervening and saying no we need to get more support here first and they handed over more information after he cardioverted than before he did umm so whilst, but then again that's something I would want to work with them on that is what I would want to feed back to them if would be something I'd want to encouragement on and then I'd like I would want to work through that again with them to allow to replay it."*
>
> Semi-structured interview participant H, lines 72-84

In participant H's utterances there are indicators that this is the case:

> *"Could have asked about the blood pressure in a more professional way, explained why".*
>
> Utterance participant H, comment 15

> *"I'm glad that they are communicating these observations but I am not happy about the way they are doing it."*
>
> Utterance participant H, comment 40

Participant H is no longer using examples such as hand washing and hygiene that were highly commented on in both the utterances when watching the video and in the semi-structured interview, and instead the focus is on the interaction with the patient. Participant H does continue later in the interview to qualify the behaviours seen and appears to make allowances for the fact that it is a simulation and therefore not real life.

> *"And what I would say is, their competence lacked was in their maturity dealing with the patient but that comes with time and experience".*
>
> Semi-structured interview participant H, lines 61-62

5.4 Combining the Verbal Data and the Eye Tracking Data

The data sets were brought together in order to validate the conclusions drawn from each of the individual data sets through triangulation of the findings. Each set of data provides information, but relying solely on the verbal data is to rely on what the participant wants to say and speech can be a slower process than vision. There is almost continual action in the video with up to seven main areas for the participant to look at and comment on: four students, a doctor, a mannequin and the surrounding environment. Relying on the verbal data alone does not demonstrate how the participant is coming to their conclusions unless they verbally provide a rationale for their comments. This is addressed somewhat in the semi-structured interviews when the participants were asked to comment on what they had seen and what they thought, but this is after the fact and the evidence is clear that this post-hoc rationality can alter the viewer's perception of what they have seen (Polanyi, 1966; Martinez, 1992; Bojko, 2013). What did the participant look at when they were watching the video? Does this provide an insight into their judgement? They are clearly signalling behaviours and signifiers of competence and making statements with a performative action, but what are they basing this on? As an experienced critical care nurse and lecturer this simulation and scenario are not uncommon to me; therefore, I am able to apply some of my own knowledge and interpretation to what I see and what the participants are commenting on. Whilst this may support the validity of the comments and certainly facilitates the understanding of the data and the participants' intentions, it does not necessarily support the identification of what they are looking at and why they are commenting as they are. The same video is being interpreted and behaviours judged in different manners, and tracking of the participant's eye movement gives a further insight into what they are seeing, perceiving and passing judgement on.

Ensuring that my interpretation of the data was reasonable I drew on both Monger and my supervisor to sense check, drawing on the data presented within this chapter to discuss the conclusions that I had drawn. I presented them both with data from this phase and asked them to consider what they felt the participants were saying and looking at, prior to engaging in a discussion that both confirmed my interpretation of the data and validated my hypothesis that turning gaze-to-text was a promising method of analysis. To validate the findings, bringing the data sets and conclusions from each of the data sets from each of the participants is an important final part of the analysis. Each participant's data, eye tracking, verbal utterances whilst watching

the video and responses in the semi-structured interview, are brought together here, and the participant's voice is used to illustrate their negotiation of the text and construction of knowledge. This also enables the readers to make their own judgements and conclusions.

5.4.1 Conclusions from Participant D

The starting point to consider participant D's judgement on the perception of the students' level of competence is found within their semi-structured interview where participant D states:

> *"And she was standing back a bit and taking a bit of stock of the whole situation, she wasn't going to let him put his pillows on the floor. She gave the other one the defib, she just seemed more in control of the entire situation. These two I'd put fairly evenly but they were both fairly focused on their patient and they seemed to be looking fairly appropriately picking up on things using the obs machine, you know the monitor to take obs. Seemed to be getting it right this one was just hopeless she, I don't know it may be simulation and she was uncomfortable but she was just she was just hopping around the bed from foot to foot, it looked like she was trying to look busy but wasn't. And the patient would be talking and wasn't looking at them. She moved her head around almost like she thought she should be looking at things but she didn't actually look at any of the right things I felt, she was just hopping around trying to look useful I don't think she touched the patient barely there were things going on and I suddenly thought what she didn't seem to respond to what was going on."*
>
> Semi-structured interview participant D, lines 19-32

When watching the video and considering the verbal descriptions of the students it becomes clear which student participant D is talking about. My notes written on the transcript help to show how the students have been identified:

> Talking about student D with initial positive comments, noticing actions that contributed to the scenario but not direct patient care. Looking at environmental factors such as trolley and pillows. Identifying that she seemed in control and using behavioural terms to justify this thinking.
>
> 'Two' fairly even are B and C and the hopeless is A. Again, use of interaction with the equipment is used to describe and justify thinking.
>
> My notes when listening to the semi-structured interview

Participant D is judging each of the students individually, justifying their decisions using examples from what they have seen. There are clear similarities with the language used within both sets of verbal data from participant D, who made 21 comments whilst watching the video, eight of which were negative and 10 positive (three were mixed). Watching the video with the eye movement of participant D superimposed and listening to the utterances confirms the conclusion that participant D has consistent judgements about the students' performances and that they have based this on their interpretation of what they have seen.

Participant D used their own knowledge and experience to comment and make judgements on what they are seeing and their eye movement can be interpreted as a clinical act in the safety sweep prior to cardioversion. An interesting point to explore if the data were available would be the participant's own interpretation of this and whether they have consciously attended to this or whether their experience and background has allowed them to develop expertise in this field. With the limited biographical information available, it could be suggested that their experience in critical care (10 years) and the teaching position held at the time of the recording has influenced both the eye movement and the judgements made.

5.4.2 Conclusions from Participant E

Participant E made 31 utterances during the viewing of the video, with 17 negative comments, ten positive comments and four mixed. Participant E refers to one student in particular throughout the utterances, making comments that highlight her concerns about this individual. These concerns are confirmed in the semi-structured interview where participant E states:

> *"I feel really confident about three of them um because initially it was only two of them because one of the girls took a little while to get involved but she did and in fact she actually started to take the lead towards the end but there's one girl in there that really I would be really not confident enough to pass her just based on this."*
>
> Semi-structured interview participant E, lines14-17

and later:

> *"The whole way through she didn't do anything. I just thought that it was going to be a confidence issue at first and to get used to simulation and to sort of get into it but she didn't, she didn't overcome that and she was quite happy to stay in that 1 spot apart from when [doctor] came in and started to say umm what went wrong then he cardioverted her and then the patient and then obviously wanted a bit of background history and the person who hadn't done anything volunteered to talk to him about the history but how do you know if you haven't done anything [laughs] bit angry?"*
>
> Semi-structured interview participant E, lines 27-34

Viewing the video whilst watching the eye movement and listening to participant E's utterances confirms which student is being discussed here and patterns are emerging in the participants' judgements. Interestingly, participant E did not mention the male student in the semi-structured interview but there is no indication as to why.

Participant E was the least experienced of the three participants with just three years' experience as a qualified nurse, and two of these in an elderly care environment. This situation may therefore not be a regular occurrence, which may have influenced the participant's utterances and final judgement of the students' performance.

5.4.3 Conclusions from Participant H

Participant H provided the greatest number and volume of utterances whilst watching the video with a total of 61 comments, 55 of which signify negative judgement of behaviours. In the semi-structured participant H provides an overall assessment of the students' competence and identifies individual elements, such as not addressing the patient's need (lines 12-16) and the handover (lines 69-70). Participant H uses such examples to indicate that they are unhappy with what they have seen but waits until they know which year the students are in before making a statement about competence.

H: *I would hope, that they're in year one, I would have thought year two*

EM: *They're actually third years*

H: *Really? Umm [phone rings] sorry, [STATIC] they didn't stand out as being incompetent there was evidence certainly with these three that what they were doing was underpinned with existing knowledge but that was quite theoretical*

EM: *Right*

H: *And what I would say is their competence lacked was in their maturity of dealing with the patient but that comes with time and experience*

Semi-structured interview participant H, lines 55 – 62

It appears here that participant H is altering their perception when they hear what year the students are in, making adjustments based on the standard of competence they have previously applied to the students and then offering additional context. Certainly, the utterances whilst watching the video appear to differ from the conclusions that participant H draws in the semi-structured interview. This may be indicative of the assimilation of knowledge as information is received (Vosniadou, 1994).

Watching the video with participant H's eye movements and the utterances playing, it seems that participant H has short fixations and more saccades than the other two participants. Participant H scans the environment with fixations on objects, such as the oxygen tubing and the emergency trolley, rather than the students in the video. Further analysis of the eye tracking data and overlaying the eye movements would allow for this but due to the manner in which the data was captured this was not possible with this data set.

5.5 Conclusions from Phase One

The analysis of the data has shown interesting findings concerning the nature of the nursing gaze. All three participants drew similar conclusions as to the competence of the students within the video but used different language to verbalise this and looked at different things. Whilst there is agreement in the outcome that enables conclusions to be drawn, questions remain as to why these differences are present. Are they indicators of the same thing or are they proxies? The multiple indicators that have been identified within this small data set may indicate the nature of holistic care and the role that experience plays in the development of tacit knowledge. Further information about the participants, and in particular their clinical experience, may offer illumination.

The presence of the doctor changed the dynamics within the simulation and the viewers added this to the frame of reference, whereas they had previously been discussing the students in relation to each other and the patient. When the doctor arrived in the scenario all three participants were quiet, and this is only one of two points where all three were silent. Watching the video were they listening to collect information so that they could both understand the plan for the patient and to use as a benchmark for the student's competence from that point?

It was clear within the data that the interaction with the patient, environment, equipment and other students were important for the participants, each referring to them in the verbal data. The eye tracking data also showed that these relationships were important for information gathering and interpreting the students' behaviours, and therefore consideration of people within the video for phase two needs consideration. This indicates that the gaze may be more than just the observation of the patient; its totality includes interactions with others, and the unseen and unspoken power within relationships.

From the analysis it was evident that the tools used were appropriate for the purposes of the study. Combining them in this manner, gathering the data simultaneously and interweaving the analysis, allows for each tool's limitations to be overcome and allow for a deeper analysis. Each of the data sets and subsequent analysis provides information on each of the component parts but by bringing them together a deeper analysis is possible. Taken alone the utterances from the participants when watching the video provides suggestions as to the performative indicators of their comments, but this is dependent on the researcher's interpretation of their intention and performative function. The validity of such an interpretation can be strengthened through the consideration of the viewer's responses in the semi-structured interviews, looking to see whether there is convergence. The final element supporting illumination is the eye tracking data, which can be used to see what the viewer is looking at before, during and after their utterances.

Combining the three data sets from each of the participants allows for greater insight into what information the viewer is gathering and how they are using it.

The analysis of the eye tracking data where boundaries have been applied and considered over all for the three participants is clearly something to be explored further in order to examine the link between eye movement and how performative statements are made. Considering the segments for an individual participant offers interesting insight into what they were looking at prior to making a comment, and therefore offers a way of exploring what they have based it on. However, when segments are identified by considering areas of similarity, i.e. participants speaking or not, valuable insight into the visual behaviour, or nursing gaze, can be gained and then combined with the verbal data to draw conclusions.

5.6 Value of the Data

When considering the data drawn on in phase one it is clear that each set had value, although some were greater than others. I began this study believing that the eye tracking data would give insight into the nursing gaze as a means of capturing the visual attention of the viewer, yet on reflection it has been the verbal utterances that have been of most value. However, while the eye tracking data has truly been a means to see what the viewer is looking at, it does not say what the viewer found important or used to sense make. It is the verbal data, taken from the concurrent thinking aloud and semi-structured interviews, which has provided the greatest insight into the nursing gaze. The verbal data from the concurrent thinking aloud has been the primary source of data, anchoring the eye tracking and sense checked by the semi-structured interviews.

5.7 Achieving the Objectives of Phase One

Phase 1 was concerned with achieving five objectives:

1. Identify components of the nursing gaze as suggested by the literature review (addressed in Chapter 3)
2. Identify and test methods to identify the nursing gaze
3. Identify whether video of simulated nursing practice can be used as an appropriate stimulus for the capture of eye movement and verbal data
4. Identify and test methods of analysis of eye movement when watching video
5. Identify and test methods of analysis of the verbal data when watching video

The first objective was addressed in Chapter 3 and drew on the literature in Chapters 1 and 2. Chapters 4 and 5 subsequently addressed objectives 3, 4 and 5 through the first of a 2 phase

study. Proving that the tools and methods identified in the first chapter of this study are suitable for the illumination and articulation of the nursing gaze leads to the development of an experiment in Chapter 6 to address the main research question.

5.8 Chapter Conclusions

Turning the nursing gaze into text for the viewer to negotiate and interpret opens opportunities for exploration of the gaze, as well as identifying limitations in the approaches within the literature. Chapter 5 has drawn from the analysis presented in Chapter 4 to address the objectives of phase one, and the identification of the signifiers in the verbal utterances of the viewers has begun to offer a way to see the nursing gaze. The themes and codes derived from the analysis of the viewer's negotiated text combined with the eye movement of the viewer offers a solid foundation on which to proceed, proving the concept that the nursing gaze can be turned to text in order to identify the tacit and unarticulated.

Chapter 6 - Phase Two Methods

6.1 Introduction

Chapter 5 concluded that the methods developed in phase one to illuminate and explore the nursing gaze have been successful. The second phase of the study builds on this and this chapter presents the experimental approach taken to test the conceptual theory from Chapter 3 employing the methods from phase one. Drawing on the work that has been presented so far in this thesis, this chapter begins by providing the foundation for a second phase with the justification for the development of a single arm study designed to explore the nursing gaze.

6.2 Experimental Methodology

Experimental methodology traditionally sits within the quantitative paradigm and uses an inductive approach advocating the taking of a very specific observation and using that observation to confirm a more general hypothesis. It is not traditionally associated with the post-structuralist philosophy; however, drawing on an experimental methodology and bringing together the methods and approaches within this study demonstrates an appreciation of the role of methods and what I believe to be a bricoleur approach (Gobbi, 2005) in order to explore the new spaces, which welcomes messy and multi-voiced texts in Denzin and Lincoln's fractured future. Here it acts as a framework for the collection and analysis of data, whilst allowing for the control of the variables considered to form the gaze and providing an environment in which to gain access to the 'voices', with the viewer as the negotiator of the text.

When looking to develop this experiment a number of possible mixed method designs were considered, and the embedded design model of Cresswell et al. (2005) appeared to be the closest fit; however, this does not clearly support the co-alignment of the data collection and analysis. Therefore, a design which drew on their theory of embedded deign combined with co-alignment in both the collection and analysis of the data was created (Figure 25). As experimental frameworks and methods are increasingly used in none traditional ways, further consideration will need to be given regarding how to embed and co-align such methods.

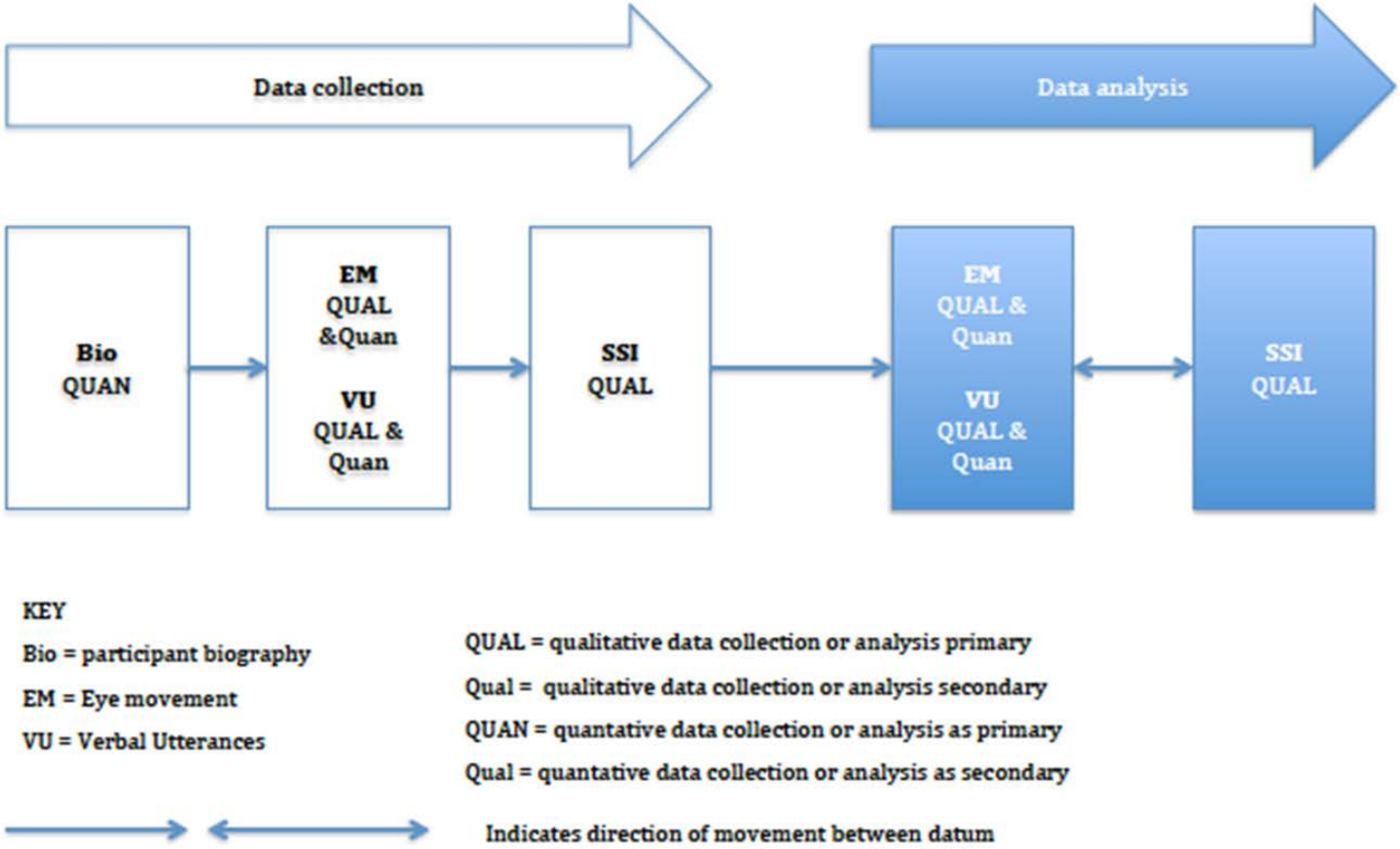


Figure 25: Diagrammatic representation of the experimental design of phase two

6.2.1 Foundation on which to Design an Experiment

This thesis has previously established eight points:

1. The tacit nature of the gaze can be identified and explored through the analysis of eye movement and verbal utterances collected whilst watching a video of simulated nursing practice
2. The video in use must meet certain requirements
3. The level of experience of the viewer is an appropriate variable to be used in the exploration of the nursing gaze
4. The analysis of verbal utterances considering the performative function is a valid method of analysis
5. The analysis of eye movement drawing on the post-structuralist approach of turning to text is a valid method of analysis although it requires greater consideration
6. The application of boundaries drawing on the methodology of applied thinking aloud is a valid approach to the analysis of eye movement and verbal utterances
7. The use of semi-structured interviews and combined with eye movement, and verbal utterances allows for the cross-checking of conclusions and increases the validity of the findings
8. The researcher as the receiver of the message must have the knowledge to be able to receive the message as intended

With a proof of concept established, it is important to test the theory, and a single arm experiment was designed in order to answer the research question posed at the beginning of the study, drawing on the level of experience of the viewer as the independent variable.

6.3 Phase Two Experimental Design

A single arm experimental design was used to identify the eye movement and verbal utterances of two groups of participants with level of experience as the independent variable to identify and explore the characteristics of the nursing gaze. Using the level of experience as the variable it was purported that the perceptive and cognitive elements associated with the novice and expert would be elucidated, allowing for conclusions to be drawn. Three possible outcomes were established:

1. That there will be discernible differences in the eye movements and verbal utterances between novice and expert nurses
2. That there will be no discernible difference in the eye movements but that there will be in the verbal utterances between novice and expert nurses
3. That there will be no discernible difference in the verbal utterances but that there will be in the eye movements between novice and expert nurses

These outcomes are revisited in Chapters 7 and 8.

6.3.1 Aim and Objectives of the Experiment

The aim of the experiment was:

To articulate the characteristics of the nursing gaze through the analysis of eye movement and verbal data obtained through the application of experimental methodology

In order to achieve this aim three objectives were identified:

1. To create and conduct an experiment which utilises level of experience as the independent variable to identify the perceptive and cognitive elements of the nursing gaze through the analysis of eye movement and verbal data
2. To assess the validity of the methods of data collection as methods of capturing the nursing gaze through a comparison of the findings from each data set
3. To assess the validity of the analysis that has drawn on ethnographic techniques to the data collected through the recording of eye movement, verbal utterances and semi-structured interviews

Each of these objectives are described in detail below before moving on to present the practicalities associated with the running of an experiment.

6.3.1.1 Objective 1

To create and conduct an experiment which utilises the level of experience as the independent variable to identify the perceptive and cognitive elements of the nursing gaze through the analysis of eye movement and verbal data

The study was designed as a single arm exploratory experiment with two groups of ten participants identified as novice and expert nurses. As individuals they would watch a video of simulated practice and whilst watching think aloud their thoughts. After watching they would then be asked to explore their thoughts through a semi-structured interview. Through the

recording of the viewers eye movement the perceptive element (what they looked at) would be captured and the thinking aloud would provide insight into what they thought about what they were seeing (the cognitive element). It was hypothesised that the novice group would share characteristics associated with their level of experience and that these could be used to further develop the understanding of the nursing gaze.

6.3.1.2 Objective 2

To assess the validity of the methods of data collection in capturing the nursing gaze through a comparison of the findings from each data set

The method of turning the eye tracking to text and the use of applied thematic analysis had been developed using previously existing data. These methods have been informed by the literature and whilst they had proven successful in achieving a meaningful analysis and being able to draw conclusions, they required an assessment of validity using a larger data set. This experiment was designed to assess the validity of these methods on a larger data set and through triangulation of the data, allowing all the findings to be brought together to develop the concept of the nursing gaze.

6.3.1.3 Objective 3

To assess the validity of the analysis that has drawn on ethnographic techniques to the data collected through the recording of eye movement, verbal utterances and semi- structured interviews

Ensuring the validity of the analysis requires bringing both the analysis and findings together from both the initial development of the methods and the experiment, placing them within the literature. In this way the truthfulness of the findings can be considered, as well as the new knowledge contextualised. A key part of this is the reflexivity of the researcher, and therefore this required careful planning through the use of a reflective diary, the continual revisiting of the data, and my own constructed text.

6.4 Designing an Experiment to Explore the Nursing Gaze

This study's aim was to explore and gather knowledge, rather than an opportunity to test a theory driven hypothesis, although it is informed by theories and the literature has been previously drawn upon. The experimental method is therefore used as a vehicle to explore, rather than confirm, which is an important distinction (Water, 2007). The conceptual framework presented in Chapter 3 acted as the basis on which the following experiment was designed. As seen in the

conceptual framework, the nursing gaze contains both cognitive and perceptive elements, and the experiment needed to allow for the capture and articulation of both. The discussion of the literature and the limitations identified in the previous chapters led to the development of four hypotheses:

1. Level of experience can be used as a variable for exploring the nursing gaze
2. A video of dynamic simulated nursing practice is an appropriate stimulus for exploring the nursing gaze with the viewer as the negotiator of text
3. Performative utterances reflect the perceptive element of the nursing gaze
4. Eye movement reflects the cognitive element of the nursing gaze

Cognition within the gaze

The literature review in Chapters 1 and 2 demonstrated that eye movement is an indicator of a viewer's cognition. Drawing on this well-established methodology and combining it with verbal utterances supports the illumination of the nursing gaze. As presented in Chapter 4, the use of saccade patterns and heat maps offers the opportunity to turn eye movement into text. Combined with a narrative as to what the eye movement is focused on, gaze-to-text addresses the challenges of analysing eye movement when a dynamic stimulus is employed.

Perception within the gaze

Perception is concerned with the understanding of what the viewer is seeing (Rose, 2012). To capture the perceptive element of the viewer's negotiation and construction of knowledge, thinking aloud is required. As discussed in Chapters 1 and 2, this approach enables insight into what the viewer is thinking as they watch the video. Drawing on the approach of semi-structured interviews after the viewing of the video offers the opportunity to delve deeper into the viewer's construction and validates my own interpretation of what they have said.

Level of experience as the variable

The literature review and conceptual framework identified that with experience the nursing gaze will develop, and therefore this is a variable that is open to manipulation. Whilst others may also be used, level of experience is straightforward to contextualise and identify. It was therefore used in this experiment to create two groups of participants: (1) novice and (2) expert nurses.

Video as the object of the gaze

The use of video as the focal stimuli permits the development of a negotiated text (the viewer's narrative) to provide an insight into the reality of nursing. According to post-structuralist philosophy, readers are not passive consumers of text, rather they are active in a process of negotiation between the viewing position created by the text and the understandings that the

reader brings to the text (Cheek, 1996). It is therefore important to consider the text that the viewers will be negotiating, in this instance simulated nursing practice.

There is a plethora of evidence regarding the use of simulation as an educational tool in nursing, with advantages including the control it affords over the situation and allowing for scenarios that may be rare or unpredictable (Medley and Horne, 2005; Buckley and Gordon, 2011; Kelly et al., 2014). However, simulation, regardless of how high-fidelity the equipment and setting, is not real-life and therefore debate must be had over whether it is appropriate as a text for the viewer to negotiate. Consideration was given to the use of a 'real-life' situation recorded in clinical practice, but the difficulties faced when this was explored gave rise to the decision to again use simulated practice. These difficulties included access to patients via gate holders and ethical approval, whilst it appears that documentary makers are able to access patients and hospitals, filming both staff and patients, when the motivation is research then there is a raft of barriers to overcome. This led to the pragmatic decision to use a video of simulated practice as Monger had. This also meant that a specific scenario could be designed that would provide the viewer with a variety of elements which were dependent upon the viewer's experience and knowledge, thereby providing insight into the nursing gaze. In order for the video to be appropriate the literature was consulted and 11 criteria were developed which are shown in Table 23.

Table 23: Principles on which the video was chosen

1.	Be based on simulated nursing practice
2.	Include more than one person to offer the viewer behaviours to interpret and see the relationship between people
3.	Be filmed from a static camera to ensure that the editing of the video does not affect the viewer's interpretation
4.	Show nursing care being delivered to a patient, as this is the focus of the nursing gaze
5.	Have participants moving around within the screen in order to test gaze-to-text
6.	Have clear audio and visuals to enable the viewer to clearly see and hear the action
7.	Be no longer than 20 minutes in length, as after this it becomes uncomfortable to sit still which in turn affects the accuracy of the eye tracking
8.	Have a clear story to the simulation which is not unusual to the audience/viewer
9.	Use appropriate technology which limits undesirable noise
10.	Be available and have the relevant permissions from those within it in order to adhere to ethical principles
11.	Be in a format compatible with the software to be used

The video chosen was captured as part of another study where three students participated in a simulated practice session using wearable technology. It not only met all of the criteria but I was also involved in the development, running and filming of the scenario, and was therefore familiar with it.

6.4.1 Chosen Video of Simulated Nursing Practice

As this experiment was being designed an opportunity arose for involvement in a research study exploring the use of technology in nursing practice. One part of this involved student nurses delivering nursing care to a simulated patient whose condition was deteriorating. As part of the team supporting this simulation I identified that the video would be appropriate for this experiment as it met all of the criteria outlined in Table 23 and the participants had given their consent for its use in other studies. After a discussion with the students involved and the project team, agreement was made that this would be the video for the experiential phase of this study.

For this video the project team for the simulation purposefully recruited year three students and full consent was given for the video to be used for research purposes. Two academic members of staff acted the roles of the nurse and the doctor, and the mannequin was voiced by another academic staff member, and all of whom were experienced in simulated practice and had critical care nursing backgrounds. The 'patient' in this scenario was a medium-fidelity mannequin (SimMan 3G^{TM}) controlled and voiced remotely in order to give real-time feedback and responses to the students. The students were told that the patient in the scenario, 'Mr Clarke', had been admitted the previous day with chest pain and that they were required to assess him and act accordingly. The aim of the scenario was for the students to undertake a full assessment and intervene when his physical condition deteriorated (the full scenario plan can be seen in Appendix F). The video was 20 minutes in length, although it was shortened to 17 minutes for use in this experiment, and shot from various ceiling mounted cameras. The view chosen for use in this study is from the camera that gave the best view of the patient and the students (Figure 26).

Figure 26: Screenshot of video used in phase two

6.4.2 Ethics and Ethical Considerations

Ethical approval for the study was granted by the author's University Ethics Committee in September 2011. The protocol was resubmitted due to the time between the first approval and the experiment taking place, and was approved in January 2016 (ethics number 14578) after amendments were made at the request of the ethics committee who did not permit the recording of the participants whilst viewing the video. This had been requested as it would have allowed the viewers' behaviour and posture to be captured, which supports the analysis of the eye tracking data (Bojko, 2013; Pink et al., 2016). No explanation was given by the ethics committee as to this decision.

One challenge in using video and audio technology for data collection and analysis is that of protecting the participants. For those in the video it was not possible to protect their anonymity and they were made aware of this during the consent process. This is easier with audio only recordings, but again the participants were made aware of the management and storage of data, as well as its use and that they may be identifiable. All those involved with the study were made aware of this during the consenting process and were provided with the opportunity to rescind their consent; none did. The proposal for the study incorporated the Programme of Research and Ethics/Education protocol into Virtual Interactive Practice PREVIP (ethics number SONAM/006/2006) which details the collection and management of data, including identifiable participants and is in alignment with the Data Protection Act (1998). Adherence to the protocol ensured that the rights of all those involved were respected.

Participants were allocated codes according to group, Ex for experts and N for novices, and a sequential number (1-10) to ensure that all data was appropriately stored and could be

crosschecked. This coding was used on all data and the coding kept locked in a filing cabinet in accordance with the Data Protection Act (1998).

6.4.3 Participants, Sampling and Recruitment

Two groups of participants were identified based on their level of experience that aligned to the expert and novice nurse. The expert group consisted of registered nurses working at the author's University, all of whom were experienced clinical practitioners and familiar with simulated practice. My familiarity with my colleagues meant that I was aware of their experience, both clinical and in education, and was therefore able to identify those who met my requirements: registered nurses who had extensive experience in teaching nurses and were actively engaged in simulated practice, and who had worked as a clinical nurse in practice. Inclusion and exclusion criteria were based on the literature concerning those who may not be suitable for eye tracking, or those where there was a potential risk. (Table 24).

Table 24: Participant inclusion and exclusion criteria

Inclusion	Exclusion	Justification
Informed consent given	Informed consent not given	Consent from participants is essential to work within ethical guidelines
Individuals who do not have, or have never had a diagnosis of: • cirrhosis • schizophrenia • autism or other learning difficulty • are not currently taking neuroactive medications	Individuals who have or have had a diagnosis of: • cirrhosis • schizophrenia • autism or other learning difficulty • are currently taking neuroactive medications	Conditions impact on scan pathways and may therefore influence the data collected
Individuals who have sight in both eyes	Individuals who do not have sight in both eyes	The equipment to be used in this study is set to work with both eyes moving. If sight is only present in one eye this will impact on the data collected.
Individuals who do not have photo sensitive epilepsy	Individuals who have photo sensitive epilepsy	There is a minimal although recognised risk to individuals who have photo sensitive epilepsy

Purposeful sampling was used to recruit participants with permission gained through the Directors of Programmes as gatekeeper. Letters and information sheets with details of the timeframe for data collection were sent through the internal mail system by the gatekeeper to ten potential participants, with a request to contact me directly if they required more information or were willing to participate. The gatekeeper was an important consideration due to my relationship with the possible participants, and ensured that there was no pressure on them to participate. All ten participants agreed to participate, and times and dates were arranged.

The novice group was recruited from first year student nurses on the Bachelor of Nursing (Hons) programme at the case site. This group was chosen to represent novices having been enrolled on the programme for six months at the time of recruitment and having had one six-week clinical placement and an experience in simulated practice. I believed that this group would therefore have enough knowledge of clinical practice to be able to make sense of what they were seeing due to the experience that they had, thereby moving them away from Hoffman's naive, to Benner's novice. The students were given a five-minute overview of the study that included the exclusion criteria (Table 24) prior to a scheduled lecture, and then information and contact sheets were left for them. Students were asked to respond if they wanted more information or wished to participate, and a two-week window was given for data collection. Two students responded within five days of the request and a date and time was arranged for them to attend. After both participants had undertaken the study they recruited a further four students to participate. A further five-minute overview of the study was given to the same student cohort three weeks after the initial one, and again information and contact sheets were left. Seven additional students agreed to take part, and dates and times were arranged for the first four respondents to attend and participate. The additional students were thanked and asked to act as a reserve if needed, with all agreeing.

Once a participant had indicated their willingness to participate, a one-hour appointment was made at a mutually convenient time. A confirmation e-mail with the location, time and date was sent, reiterating the information given, and participants were asked to read the information sheet and consent form, and to ask any questions they may have. They were also reminded that they were under no obligation to participate and could withdraw at any time. The information provided to each potential participant included the exclusion criteria and asked them not to participate if they met any of them, as the literature suggested that this would mean they were unsuitable to be eye tracked or there would be a risk to them. This self-screening was felt to be the most suitable, as some of the conditions were sensitive and the participants may have felt uncomfortable disclosing them.

The key biographical data of those recruited in shown in Table 25 and Table 26. Due to the nature of the data, providing information that is more specific would lead to the participants potentially being identified.

Table 25: Biographical data of the expert group

Participant	Eye tracking	Verbal utterances	Semi-structured interview	Years as registered nurse	Years as educator	Field of practice
Ex1	✓	✓	✓	>20	<5	Primary care
Ex2	✓	✓	✓	>20	<5	Primary care & emergency
Ex3	✓	✓	✓	>20	>10	Critical care
Ex4	✓	✓	✓	>20	>10	Critical care
Ex5				>20	<10	Critical care
Ex6	✓	✓	✓	>20	>10	Critical care
Ex7	✓	✓	✓	>20	<3	Community
Ex8	✓	✓	✓	>20	>10	Cardiac
Ex9	✓	✓	✓	>20	>15	Acute
Ex10	✓	✓	✓	>20	>15	Acute and midwifery

Table 26: Biographical data of the novice group

Participant	Eye tracking	Verbal utterances	Semi-structured interview	Prior years of healthcare experience	Field of practice
N1	✓	✓	✓	10	Acute care
N2	✓	✓	✓	2	Community
N3	✓	✓	✓	4	Palliative
N4	✓	✓	✓	2	Prehospital
N5	✓	✓	✓	1	Community
N6	✓	✓	✓	1	Community
N7	✓	✓	✓	1	Acute
N8	✓	✓	✓	1	Acute
N9	✓	✓	✓	1	Acute
N10	✓	✓	✓	0	2 weeks work experience

6.5 Creating the Task

The Tobii TX eye tracker requires that a project be set up to enable data collection; therefore a project was created with each participant code and the variable of experience (novice/expert) added. Once the video had been edited it was imported into the eye tracker, and two screens of information were then inserted prior to the video, both providing information about the patient and instructions as to verbalising their thoughts whilst watching the video. The instructions, which are shown in Figure 27, were decided upon after much deliberation, as the wording needed to give instruction without pre-empting or being suggestive to the viewer. The viewer clicked the space bar when they wished to move between screen one and two, and then onto the video. Careful consideration was given to the instructions to achieve a balance between providing instructions and not being too prescriptive about what I wanted them to comment on.

Screen 1 –

Thank you for taking part in this study. The video that follows is a simulated practice session involving three student nurses. The students have been asked to assess Mr Clarke (simulated patient). They have been made aware that he was admitted yesterday having been diagnosed with a myocardial infarction. Overnight he required two doses of Frusemide due to shortness of breath.

Please press the space bar to continue.

Screen 2 –

Whilst you watch the video please think aloud. I am interested in everything that you are thinking about when watching the video in relation to the students, their nursing assessment, decision-making, nursing care, relationship with each other and the patient and anything else that you are thinking. It is important that you think aloud. When you are ready to start watching the video please press the space bar.

The video which followed this was 17 minutes in length with a final screen as the video ends

Thank you for watching, the video has now ended.

Figure 27: Instructions given to the viewer as participant

6.6 Data Collection

For each participant the step protocol in Figure 28 was followed. There was only one variation from the protocol where one participant from the expert group was unable to have their eye movement adequately captured during the calibration. As this participant was the final in the expert group it was decided not to recruit an additional participant at this time and allow for analysis of the data to determine whether saturation had been achieved.

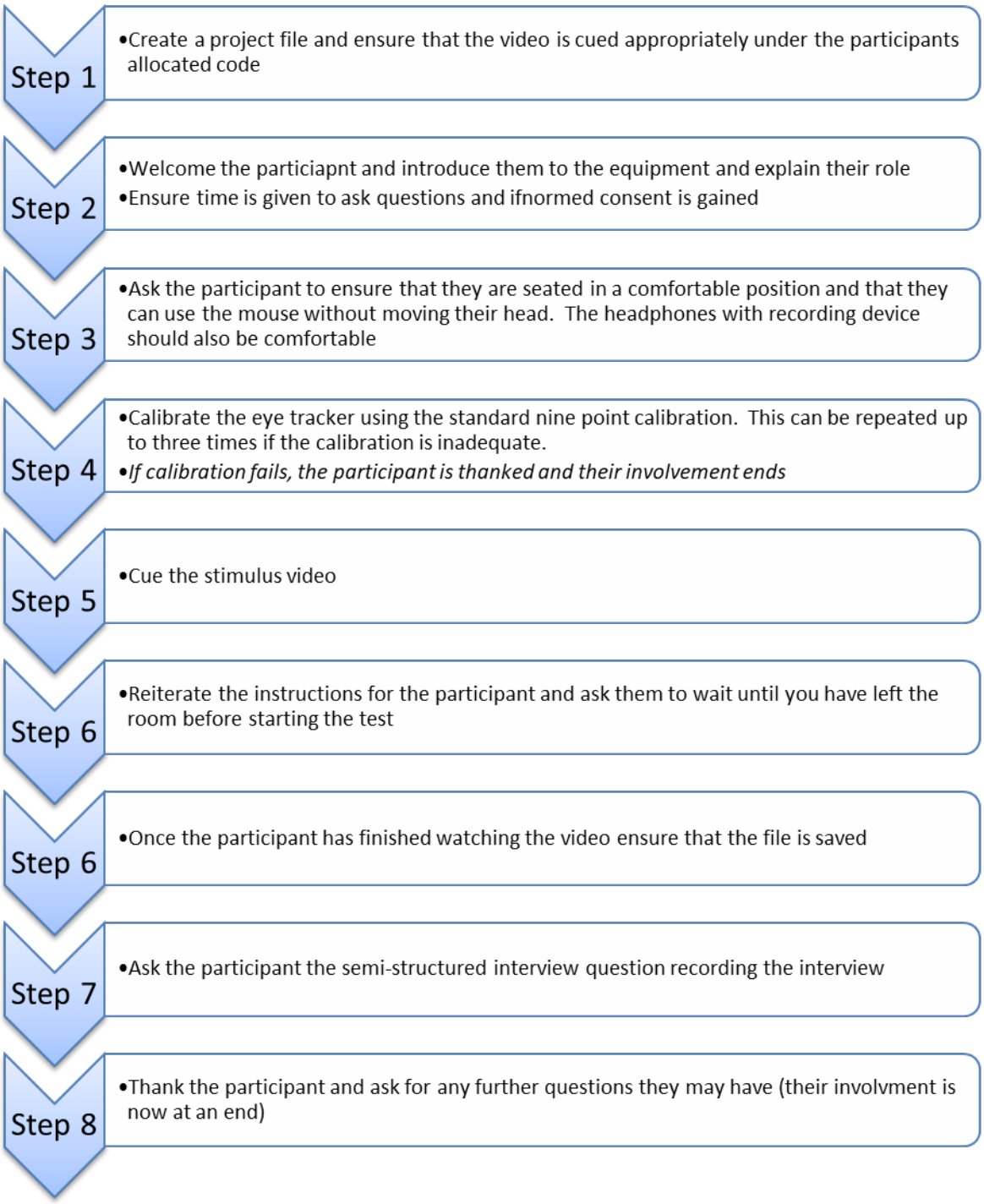


Figure 28: Step protocol for phase two

The data was collected during April and May 2016 at the author's University base using the Tobii TX eye tracker in the same location, a single office which afforded the participant with privacy.

6.7 Data Analysis

During this experiment 20 participants were recruited (10 novice and 10 expert) and data from 19 was suitable for analysis; one of those recruited to the expert group was unable to be calibrated by the eye tracker, but as the other nine experts' data had been collected and was deemed sufficient, a reserve was not used. For this experiment the steps in the analysis of the data were replicated as discussed in Chapter 4 in order to ensure reliability in the collection and analysis. Where the methods of analysis were adapted from those previously employed to accommodate the increase in data, then this is clearly indicated.

6.7.1 Identification of the Scenes and Segments

A detailed timeline was created using the movement of the students to create the initial the events within the video, and an example is shown in Figure 29. This included identifying cues from the patient, such as a complaint of chest pain, and then 30 scenes were created using the movement of the student to determine the end and then beginning of the next, to ensure that all of the video was divided and accounted for. These 30 scenes were then converted to segments, which contained one or more scene as discussed below. This approach allowed for the identification of AOIs to be created for analysis, whilst also facilitating the development of a textual description of events and actions. The positions were identified as shown in Figure 30.

Scene start	Scene end	Events	Position				
			W	O	B	N	D
		Nurse and students enter scene.					
		All introduce self to patient					
		Patient complaining about SOB					
0141	0206	Discussion about oxygen requirement	2	1	5	out	out
		student W puts oxygen saturation probe onto patient					
		Student puts blood pressure cuff on patient					
		Student B is questioning patient about how he is feeling					
		Student W is checking patients radial pulse					
		Student O is starting ABC assessment (verbalising)					
		Student W is explaining what they are doing to the patient					
		Student B says sats are 90% and patient needs oxygen					
		Student O is explaining to patient					
0207	0307	Patient complains of not being able to catch breath	1	4	5	out	out
		Student O puts oxygen on					

Figure 29: Example of detailed timeline of video

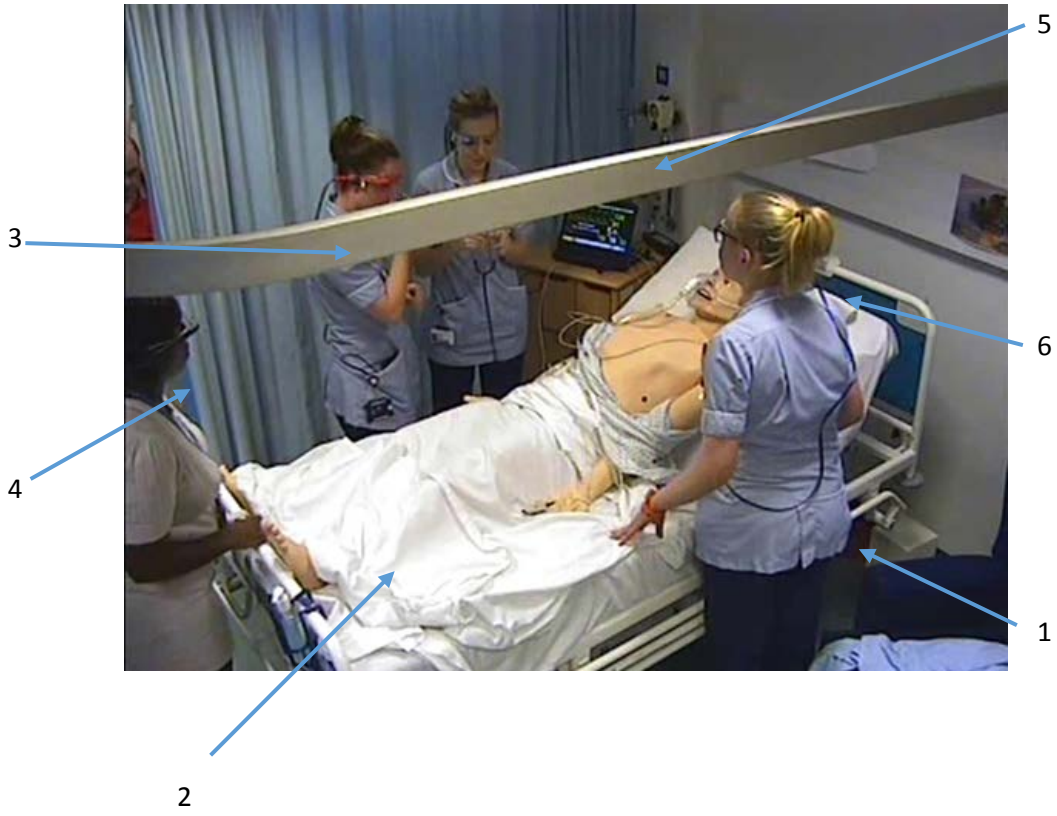


Figure 30: Example taken from the timeline of events
Key: W = student wearing white glasses, O = student wearing orange glasses, B = student wearing blue glasses

Three segments where created for in-depth analysis, as each offered an opportunity to consider a different element of the nursing gaze based on the previous analysis of the data. Segment one starts at the beginning of the scenario and was chosen to see whether the surveillance or gathering behaviour seen in the previous analysis of the data was again present, while segment two was chosen to explore the viewers' responses to the patient's cue of chest pain, and segment three provided an opportunity to see how the viewers reacted to the cardiac arrest. As the patient is defibrillated in this segment there was also an opportunity to explore whether the safety sweep identified previously was visible. Each of the segments is subsequently described within the analysis to offer context for turning the action to text. This in itself is an imposition of my own interpretation and the factual element, as well as the interpretive element is present here. A full description of each segment can be found in Appendix H.

6.8 Gaze Plot Analysis Software

Analysis of the eye tracking data in order to support the identification of the segments was undertaken using both Tobii TX and an additional piece of bespoke software created by an MEng Computer Science student (Parsons) for Monger's study, Gaze Plot Analysis (GPA). Tobii TX does not allow for the comparison of multiple eye tracking files and therefore each video required watching and analysing separately, whereas the GPA software allows for the analysis of multiple eye tracking files to be brought together. To accomplish this each of the eye movement data from the novice group was collected from the Tobii TX software and uploaded to the GPA software, along with the original video used of the simulation. The software then calculated the mathematical distance between the eye-tracked points throughout the video and produced a graph of gaze dispersion over the length of the video; the closer the gaze points are, the closer the calculated line is to the x axis and the further apart they are the greater the distance to the x axis. This is shown in Figure 31 where the initial interface screen is also shown.

Figure 31: Gaze plot software interface screen showing the gaze dispersion of novices

The GPA software was used to support the identification of commonalities, suggesting agreement of interest and differences between the novice and expert group. As can be seen in Figure 31, there are a number of downwards peaks indicating that at that time the tracked eye movement from each of the participants was close together. The software also allows for the video to be used with the eye movement overlaid, with a circle to indicate the clustering of eye movement, with the diameter changing as the cluster of eye movement changes (Figure 32).

Figure 32: Screenshot showing clustering of the eye movement
These are indicated as blue dots, with a yellow circle indicating a cluster

The downward peaks of the novices and experts were considered in separate graphs; novices are shown in Figure 33 and experts in Figure 34, and then combined in Figure 35. All three of these graphs have the threshold set at 300 pixels, with anything below the line shown in green and considered for the purposes of this work to be of interest. In both the novice and expert gaze plots there are significant downward peaks during segment one and at minute seven, which is during segment two. On reviewing the video at eight minutes the students are looking at the patient's feet and under the sheet for signs of bleeding, and both novices' and experts' eyes are drawn to this action. When the eye movement of both the novices and experts is combined then the same downward peaks are evident, which is when the variation in eye movement is minimal and is therefore suggestive that this has caught the viewers' attention. These are therefore AOIs and there is agreement between the viewers that is believed to be significant in the analysis, indicating similarities between the participants in the two groups.

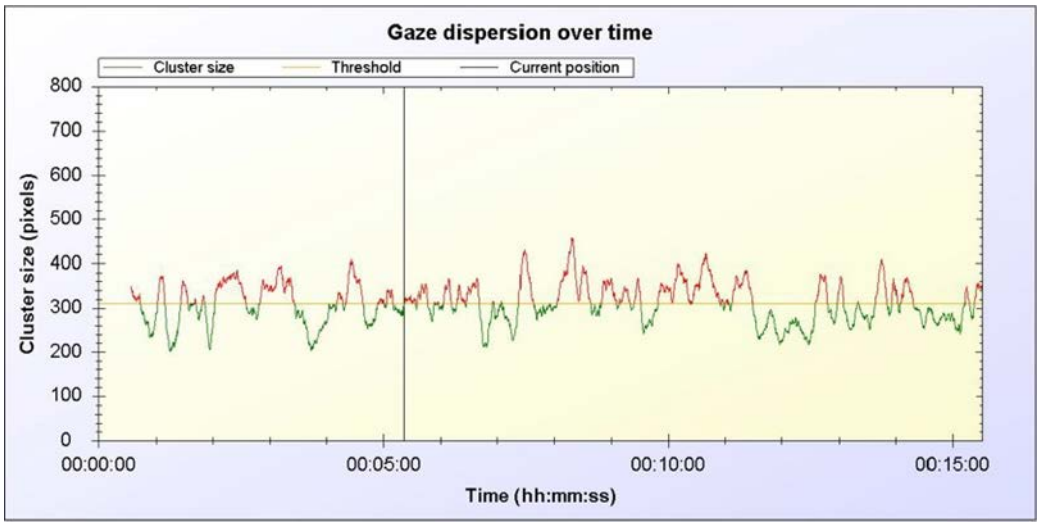


Figure 33: Gaze dispersion of novice participants

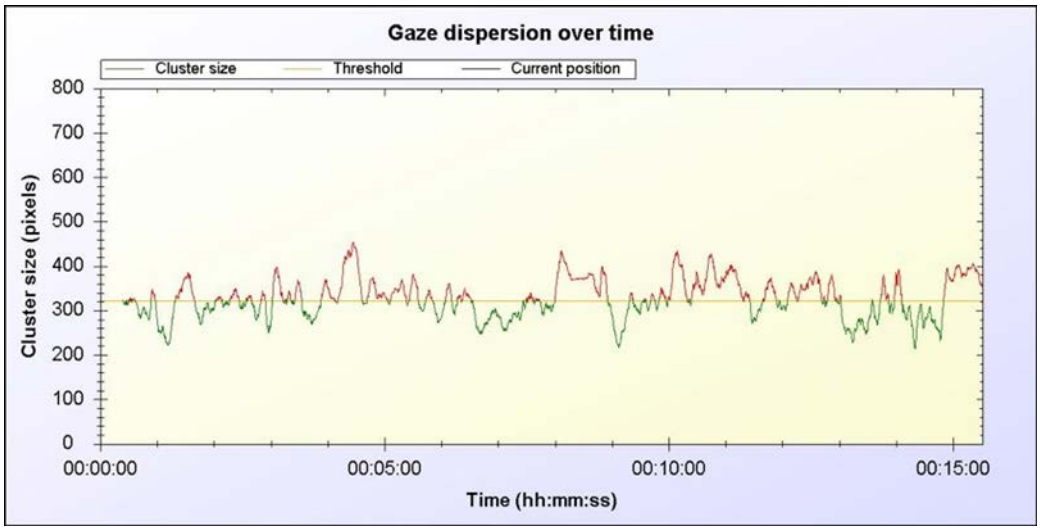


Figure 34: Gaze dispersion of expert participants

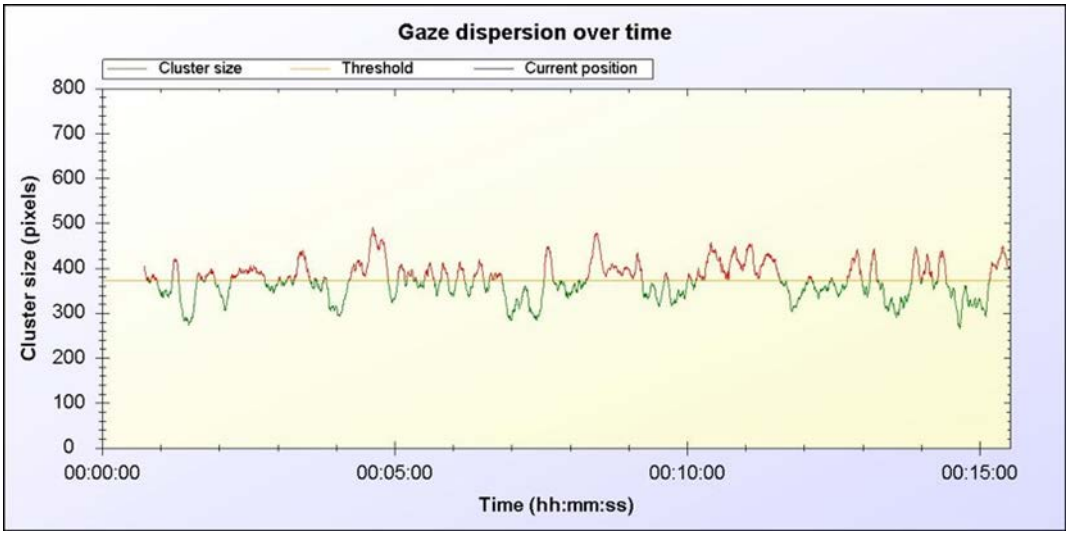


Figure 35: Combined gaze dispersion of expert and novice participants

This software is not yet sophisticated enough to conduct further in-depth analysis, although the visual nature of the graphs allow for easy recognition of areas of significance. It proved to be a useful tool, supporting the identification of segments of interest and boundaries, and is compatible with the applied thematic analysis used within this study.

The process of analysis followed that detailed in Chapter 4, with any variations presented in the following sections. Rather than use the table previously utilised for the analysis of the verbal utterances, the decision to bring all of the data together for each participant by segment was taken. As can be seen in Figure 36, a new table was developed which allowed for the verbal utterances together with the analysis, eye movement represented as heat maps and scan pathways, as well as the textual description of the eye movement, to be considered together. This allowed for the development of gaze-to-text, a means of representing the eye movement as text and placing it within the context of the verbal data.

Such an approach has not previously been reported in the literature and was developed in order to address the limitations with the software and the challenge of video as the stimulus. This was initially born from the belief that nothing is outside of text and therefore there this would be a way to represent eye movement as text. The Tobii TX software allows for eye movement to be represented as heat maps and saccades, but this did not feel as though it gave a clear enough representation of the dynamic nature of the movement, which was vital to the analysis. Whilst watching the eye movement I was taking notes, concerned with what the viewer was looking at and the order of attention, seeing that they were looking at objects and areas that they did not appear to comment on. In Chapter 4, this led to the discovery of 'seeing the unspoken' and this concept was further developed into what is referred to within this thesis as gaze-to-text. Naming it in this manner identifies this approach as novel and encompasses the methods employed with the analysis of eye movement within this study.

The narration of the eye movement is not established in the literature and demands that the researcher interprets what they are seeing and makes judgements and comparisons. Had the software been available to measure the length of saccades then this would have added to the reliability of the judgements being made. This may be seen as a limitation in the analysis; however, it led to the development of gaze-to-text, an approach suitable and valid for use with a dynamic stimulus such as video.

6.9 Gaze-to-Text

Gaze-to-text begins with the careful documenting of events in the video and the creation of segments using boundaries. Once these have been identified the researcher as viewer can watch the eye movement, speeding it up and slowing it down, whilst considering what the viewer is looking. This requires notes to be taken on: (1) movement patterns; (2) length of saccades; (3) length of fixations; and (4) focus, as well as interpretations of what is happening. For instance, does the eye movement follow an event? Does it track a person or object? This is an iterative process moving between segments to identify themes and patterns, and seeking them in other areas. For each segment AOIs are defined and data is collected in the form of heat maps (indicating length of time spent on an area, red being the most and green the least), scan pathways and fixations, with statistical data captured by Tobii TX, and as part of this AOIs can also defined for each of the segments to allow for statistical analysis. Listening to the verbal utterances of the viewers adds a further dimension and contributes to the development of theories. The segments based on events, such as silences and commonality in speaking, provide opportunities to gain insight into the viewers' attention and interpretation.

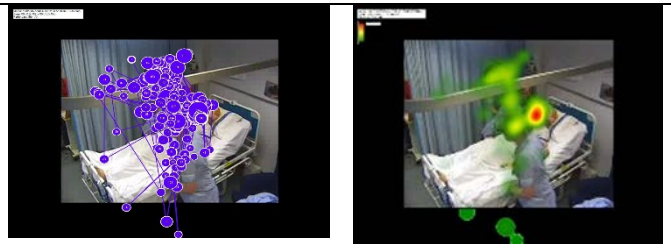
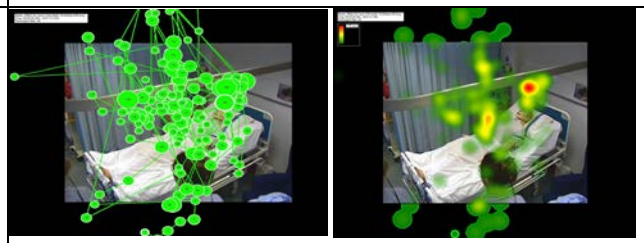
EVENTS DURING THE SCENE: The scene starts with the 3 students and nurse entering the shot with the patient lying on the bed slightly head up. The monitor is to the right of the head of the patient and is showing no current monitoring. The bed space is set up with piped oxygen on the wall and suction. There is a chair to the left of the patient's bed at the head end. Students O and W have their backs to the screen and the nurse and student B are on the opposite side of the bed……*cont'd*		
Viewer's comments & code	ok, so they're all looking at the monitor and nobodies looking at the **patient** - COMMUNICATION 2& NP 7	*ok so the students are introducing themselves* two on one side and one on the other - COMMUNICATION 2& LM5
Verbal utterances	so again they're using language that **he** doesn't understand and they're going to do an ECG and expecting to say things like just going to put these leads on your chest and why they're doing it - COMMUNICATION 2 & NP 6	*so they're speaking to the **patient*** *COMMUNICATION 2*
Comments on utterances	They need to be looking at the patient and they are therefore trying to gather information from the wrong place. The viewer is drawing on their knowledge to know that the patient will give information at this point. Critical of the use of language and lack of explanation to the patient, suggesting that they should be explaining and not expecting the patient to understand.	Using positioning to highlight students but not making a judgement. Identified that the students have noticed a cue from the patient, drawing on knowledge that this is important, identifying that more information is needed before the action is taken.
Eye movement		
Comments on eye movement	Initially scanning and following person speaking. Large fixation on patient when they speak. Looks from screen to student. As soon as oxygen is mentioned looks to oxygen on wall and follows. When patient complains of breathlessness looks at patient.	Initially scanning and following person speaking. Following action looks at BP and concentrates on students near monitor. Comments and looks at O2 when being given to patient.

Figure 36: Example of two participants' gaze-to-text data

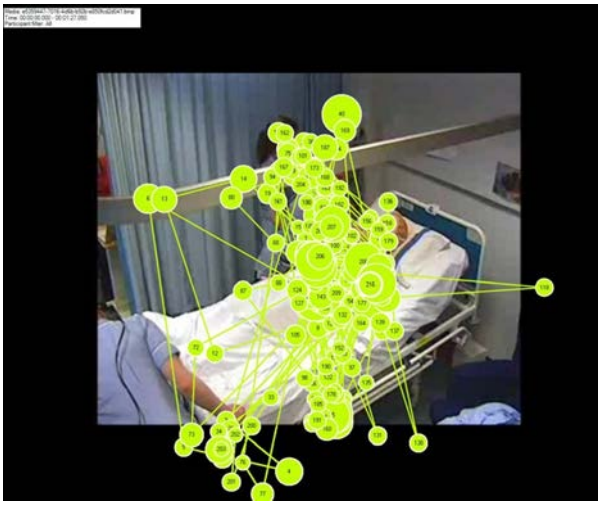


Figure 37: Gaze plot for N1 scene one

Figure 38: Heat map for N1 scene one

Figure 37 and Figure 38 are taken from Figure 36 and show the gaze-to-text format illustrating the taken approach to analyse the data. The gaze plot (Figure 37) shows the fixations in circles, with the larger the circle representing the longer the viewer spent focused on that area in between moving (saccades are shown as lines connecting the circles); when run in normal or slower speed the gaze plot shows how the viewer moved their eyes. The heat map (Figure 38) indicates areas that drew the viewer's attention during their viewing, with red areas indicating that they spent the longest time during that scene on that area. The use of both of these to explore and illustrate the viewers' eye movement patterns means that the attention of the viewer can be captured and considered in a still and compared to others in the same group and the other group. Analysing the eye movement in a qualitative manner and turning it into text allowed for all data to be seen together in a matrix, as seen in Figure 36. This allowed for the consideration of all the data in a visual manner that was easy to navigate, supporting the analysis and identification of themes, codes, differences and commonalities.

6.9.1 Creation of Areas of Interest on the Segments

To gather statistical data on length of fixation, fixation length, and duration, four AOIs were created on each segment by dividing the screen into quadrants. Dividing the screen in this way made allowances for movement within the screen and meant that direct comparisons could be made between each group and segment. An example of a screen and its AOIs is shown in Figure 39. SPSS was used to create the descriptive statistics that have been used to inform the analysis and are presented in subsequent sections. The decision to create four AOIs across the screen rather than overlaid AOIs, as in phase one, was partly a pragmatic one due to the amount of data. Due to limitations with the software and the difficulty in creating the same AOI for each segment on each video, it was decided that the use of four AOIs in this manner would provide the data required. These four AOIs were created for each of the segments for each of the videos, with accuracy ensured by creating a template of the AOIs that was attached to the screen. This meant that the fixations and saccades could be determined, and time spent on AOIs considered by allowing for small variations in the eye tracking which may be present due to each participant's calibration (see Chapter 4).

Figure 39: AOIs dividing the screen into quadrants

6.10 Combining the Data

Each analytical approach to the data adds to the reliability, allowing for comparisons and in depth exploration. The verbal data offers an insight into what the viewer perceived to be of interest, which was demonstrated through commenting on it, whilst the eye movement shows what attracted their attention, whether consciously or unconsciously. Bringing the data together and considering it as individual data sets by experience and as a whole, allows for conclusions to be drawn and hypothesis tested in a robust manner. Once each data set had been collected in this manner the semi-structured interviews were considered, with notes being taken for each of the participants concerning:

- Their immediate feelings in relation to the experience of
    - Viewing the video
    - Experience of being eye tracked
    - Usability of the technology being used
- What did the participant think with regards to what was wrong with the patient (diagnosis/health assessment)
- What they thought about the participants in the video
- Whether they required more information and what that may be

The data from the verbal utterances and eye movement were considered together, seeking confirmation of what the viewer had been looking at and what they had said. The performative functions and judgements made by the viewers were crosschecked with the content of the semi-structured interviews. This took the same approach as that discussed in Chapter 4 and ensured that the results were accurate and believable. Here the viewers' construction of knowledge and how they had negotiated the text was visible. Care was given at each stage to ensuring that the viewers' voices were heard and accurately represented, and through the extensive use of the voice in the following chapters, the reader is permitted a view of the data to negotiate and construct their own knowledge.

6.11 Value of the Data

Each data set was considered for its value on its own and when combined. In phase one the eye tracking data when turned into statistical data did not provide insight into the viewers' judgement, although when considered as text the eye tracking data was valuable. This was reflected in phase two, where although the larger data sets did provide a further opportunity to consider the statistical nature, the limitations of the software and the small groups meant that

the eye movement turned to text was the most valuable. The viewers' eye movements could be seen and what they did and did not say was important and valuable in making judgements and drawing conclusions.

The use of segments to provide boundaries again in phase two supported the in-depth analysis, and provides the results that are presented in the next chapter. Combining all of the data sets ensured that each of them had greater worth than on their own, also enabling crosschecking for validity and exploration of the text.

6.12 Chapter Conclusions

Drawing on phase one, a one-arm experiment was developed and Chapter 6 has presented this with the development and refinement of the methods to create gaze-to-text. The development of such a novel framework enabled the two groups of participants' eye movements and verbal utterances to be captured and turned to text, allowing for their individual nursing gaze to be seen and combined with others. In Chapter 7 the findings from this phase are presented.

Chapter 7 - Phase Two Findings

7.1 Chapter Introduction

Chapter 6 presented the experiment, the data collection and analysis, and Chapter 7 presents the analysed data drawing on the preceding chapters to consider how this has led to the achievement of the experiment's aims. Utilising the methods presented in Chapters 4 and 5, the data analysis was further developed to create gaze-to-text, a novel framework for the analysis of verbal utterances and eye tracking. Chapter 7 begins by analysing each of the three segments identified for analysis before moving to the analysis of the verbal utterances and then eye movement of the participants. All data sets are then drawn together for the final analyses before consideration of the aims and objectives of phase two. Throughout the chapter, the participants' eye movement and verbal utterances are drawn on to allow the reader to negotiate their own text and examples have been chosen to illustrate the points and as representative of the group when so stated.

7.2 Analysis of the Segments

Each of the segments was developed to allow for an in-depth exploration of eye movement, and each of the three segments is presented here with the events occurring in the video during that time to provide context. The AOIs for each of the segments is also presented, and the analysis draws on examples from the participants' eye movements and utterances to illustrate the findings.

7.2.1 Segment 1

Segment 1 begins with the students introducing themselves, a pivotal time for the establishment of a relationship between the nurse and patient. It is also a time for data gathering as this first interaction with the patient provides information on their current state and potential for deterioration. There is a lot of verbal action within this this segment, with the students gathering information from the patient directly and from the monitoring; subsequently there is the action of giving the patient oxygen. During this segment each of the participants' eye movements suggests that they are scanning the scene, looking for information and orientating themselves to what is happening. Once the participant has scanned the scene they then focus and fixate on the student who is speaking, quickly moving to and fixating on the patient when he complains of chest pain, and then moving to look at the oxygen when it is mentioned and then administered to the patient. The eye movement between both experts and novices shows similar characteristics, with

initial short saccades as they orientate themselves to the scene with their focus directed at movement or action within the scene. Both the expert and novice groups show signs of audio directed eye movement, and whilst they do not all comment on what they are seeing their fixations suggest what they are looking at.

Whilst watching the videos with the eye movement played back it is evident to see that during this scanning behaviour the participants are all interpreting what they are seeing in different ways but they mainly comment on communication. The comment by participant Ex1 shows an initial lack of communication with the patient, as they look at the monitor whilst participant Ex2 when looking at the same video and interaction sees this as information gathering.

Ex1 (1): *ok, so they're all looking at the monitor and nobodies looking at the patient*

Ex2 (1): *so they are gathering as much information as they can, they are keeping the patient informed*

The initial comments from all but one of the novices focus on communication, using both sense of space (participants N1, N6, N9 and N10) and verbal (participants N2, N5, N6 and N7):

N10 (1): *they all look like they're overpowering him all around him seems like there's no space for him*

N2 (1): *ok so they have all come in and said hello to the patient asked how he is feeling*

Participant N8 is the only novice to comment on the patient's physiological condition at this point:

N8 (1): *if he's come in with a myocardial infarction don't they want to do an ECG*

The expert participants appear to quickly grasp the situation, and whilst initially commenting on the communication between the students and the patient, they then move onto critiquing the behaviour of the students in the context of the situation and the students' response to the patient.

Ex2 (2): *they're struggling perhaps with priorities but they are trying to undertake a systematic assessment on an ABC basis*

Ex3 (2): *yes, suggestion to put the oxygen back on before they've done a set of observations, so now they've, so one of them has recognised that you need to do the observations first*

Ex4 (2): *so they're putting oxygen back on but it's interesting they haven't checked what the sats are*

In each of the comments shown here the viewers are both commentating on what they are seeing and drawing on their knowledge of ordering to critique what they see. Reflected in the experts' utterances is the importance of the initial interaction with any patient in the establishment of a relationship.

When the eye movement is considered it does not appear to have any direct correlation with the verbal utterances within the first few moments, with all participants scanning the scene. However, when an obvious action takes place, such as the blood pressure cuff being attached to the patient, then this attracts the eye of all of the participants. As a group, the novices' eye movements follows the blood pressure cuff and the oxygen, as mentioned by participants N1, N2 and N8 who commented on the oxygen, with participant N8 also demonstrating clinical reasoning in their utterance, not only identifying the use of oxygen but also the rationale.

N1 (4): *I can't see the sats and therefore it is sensible to put the oxygen mask on the patient*

N2 (6): *ok, so getting some oxygen to put on*

N8 (7): *if the reading said his oxygen is low they might have decided to put the oxygen on that is why*

The seven other novices do not comment directly on the oxygen or blood pressure and do not appear to use it in their judgement and utterances. All of the viewers are looking at these actions as this is happening, but do not all offer a direct comment on what they are seeing.

Using the eye movement as a focal point all viewers show fixations of varying lengths on the oxygen mask, as well as the blood pressure cuff when it is being connected to the patient but not all verbalise this. Only two of the experts commented on the blood pressure cuff, with it being the only comment that participant Ex10 makes during this segment.

Ex9 (4): *they've put the sats probe on first and then the BP cuff on but no oxygen yet*

Ex10(1): *interesting it takes two people to put on a blood pressure cuff, I'm not quite sure what the student doing with her back towards me but at least they are talking to the patient*

The experts demonstrate though later verbal utterances that they have registered this and whilst they may not explicitly address it, the blood pressure has become a part of the greater 'assessment'. Where the novices have been factual and descriptive, the experts again are using what they see within the scene to offer judgement on the behaviour of the student nurses in the video.

Ex2 (6): *they're having a think about now where to go from here having done some basic assessment, the patient's condition isn't improving, I wonder when they're going to ask for help*

What appears most evident when considering segment one is that the eye movement of all the participants shows a scanning behaviour consistent with orientation to the scene and information gathering. However, whilst the eye movement shows similar patterns, the focus of the novices' verbal utterances concerns communication with the patient, while the experts focus on drawing on what they have seen to make comments which are gleaned from the observation and recognition of salient points and clinical reasoning borne of experience.

As an example, participant Ex8 comments:

Ex8 (4): *not a very systematic approach*

To state this the viewer must have an understanding of the situation, which includes the rationale for a systematic approach and what this entails, as well as what it looks like. They immediately follow this comment up with:

Ex8 (5) *he's got a sats probe on but not sure if they've assessed his levels of oxygen SpaO2 before they put the oxygen on*

During these comments the viewer is fixating on the oxygen mask, and then moving between the monitor and the patient. The cognitive and perceptive elements of the gaze are clearly evident here as they are drawing on the information available from the patient and the monitor to make their judgement.

7.2.1.1 Descriptive Statistics Segment 1

Tobi TX allows for the collection of statistical data focused on fixations and these have been extracted for each participant and grouped together by either novice or expert to allow for comparison of the groups and trends to be seen; these are shown in Table 27 (novices) and Table 28 (experts). Tobii TX allows for more data to be gathered than that shown here, but data must be meaningful and after careful consideration the decision to present the following was made.

- Time to first fixation – this identifies the first time the viewer fixes on a point (over 200ms). This indicates the time taken to scan the scene prior to identifying the first point of interest.
- Fixation duration – this shows the length of time spent on the AOI. It is also shown in the size of the fixations within gaze-to-text.

As can be seen in Tables 27 and 28 there is no statistically significant difference within or between the groups. The novices have a longer time to first fixation than the experts that may indicate unfamiliarity with the scene.

Table 27: Descriptive statistics novices segment 1

	Mean	Std. Deviation
AOI 1 Time to first fixation	1.59810	1.948218
AOI 2 Time to first fixation	2.23790	3.935505
AOI 3 Time to first fixation	1.80540	1.728594
AOI 4 Time to first fixation	4.04300	8.078177
AOI 1 First fixation duration	0.30830	0.174206
AOI 2First fixation duration	0.41790	0.304760
AOI 3 First fixation duration	0.26400	0.192601
AOI 4 First fixation duration	0.33970	0.251844

Table 28: Descriptive statistics experts segment 1

	Mean	Std. Deviation
AOI 1 Time to first fixation	1.83433	1.579670
AOI 2 Time to first fixation	3.22044	3.706155
AOI 3 Time to first fixation	1.25611	0.947792
AOI 4 Time to first fixation	0.65967	1.130279
AOI 1 First fixation duration	0.29167	0.340628
AOI 2 First fixation duration	0.26844	0.166881
AOI 3 First fixation duration	0.35878	0.304277
AOI4 First fixation duration	0.33789	0.288115

7.2.2 Segment 2

The second segment for analysis begins with an important cue being given by the patient when he states that his chest hurts, and with his history and reason for admission this is suggestive that his condition is worsening and he is experiencing an acute cardiac event. As in segment one, there is information to be gleaned from the video by the viewer and what they look at, and the content of their utterances is used here to explore their cognitive and perceptive processes. During this segment one of the students is off screen but can be heard, and there is interaction between the students at the bedside and the student off screen.

During this scene the eye movements differ between the novice group and the expert group, with both groups fixating on the centre of the screen as can be seen by the example heat maps in Figure 40 (novice) and Figure 42 (expert), but the length and number of fixations differs between groups (Figure 41 novice and Figure 43 expert).

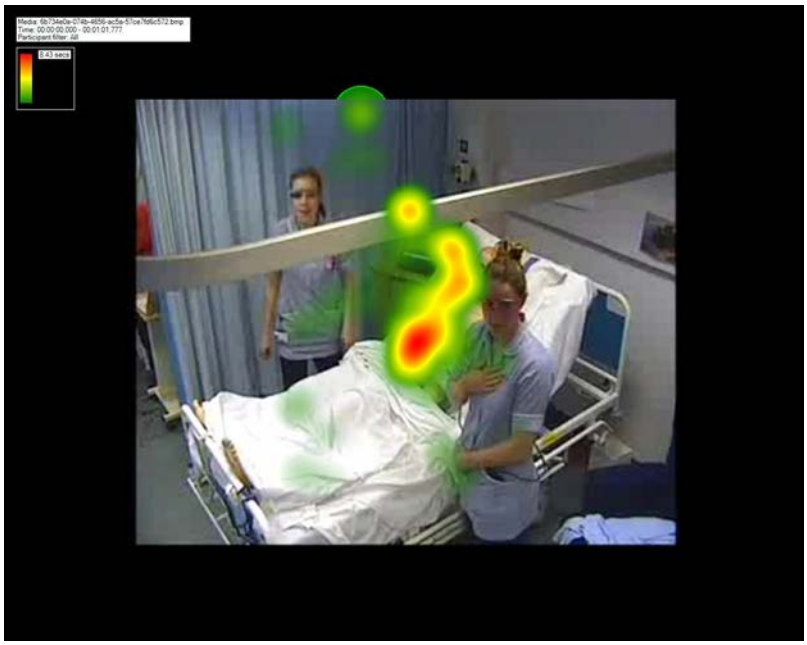


Figure 40: Heat map from participant N2

Figure 41: Gaze plot from participant N2

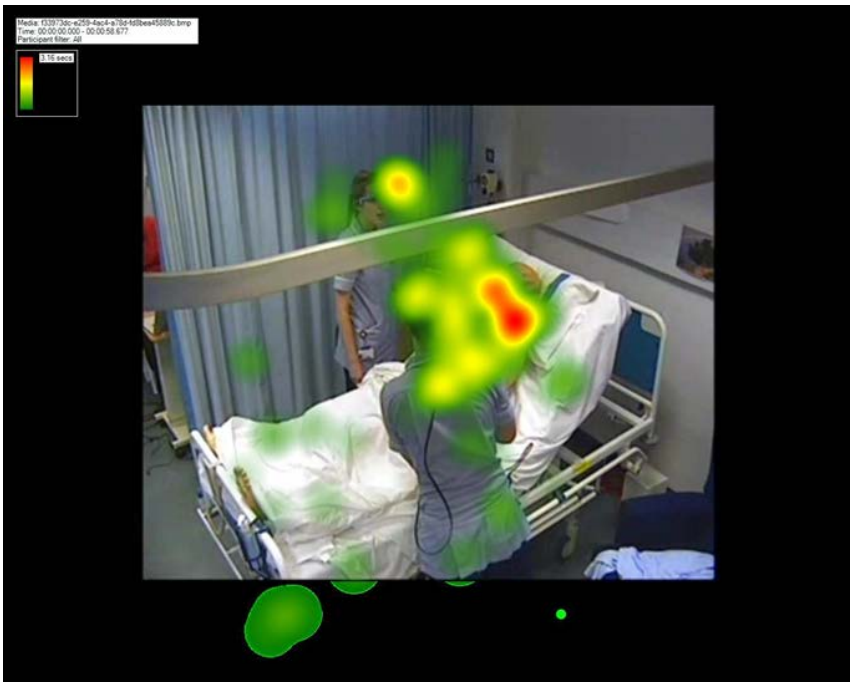


Figure 42: Heat map from participant Ex2

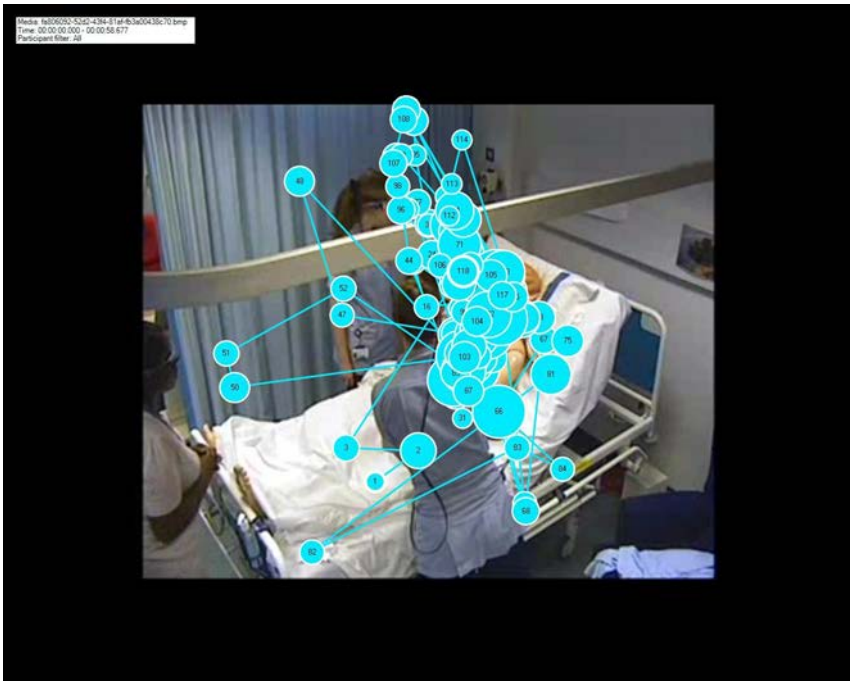


Figure 43: Gaze plot from participant Ex2

Both groups are focusing on the main AOIs (the patient) but their comments differ, with the experts commenting on the need for more information and including some specific examples of what is needed.

Ex4 (19): *so some things that are quite interesting they are not thinking about the pain score is it radiating describing the pain again I think that might be the situation and they are not expecting this and they are looking for someone more experienced to come and help them*

Participant Ex4 identifies that the students have some information but they need to follow it up, as they need to probe further to gather the information needed in order to make a diagnosis of what is occurring, and then to use this information to recognise their boundaries. The inference is that the students within the scene are unsure of what to do next, as they do not have the experience required to manage what is happening but have not yet recognised this as they have not gathered the information to make this decision.

Participant Ex3 also comments on the need for more information:

Ex3 (29): *they haven't really engaged the patient in the discussion about what's been happening today, they haven't done any of the… used the patient as a resource really*

Ex6 (9): *they're looking quite preoccupied with the physical technical assessments not taking a step back to ask more detailed questions about what his history is current problems have been*

Here participants Ex3 and Ex6 recognise that more information is required but focus on gathering that from the patient in terms of additional questioning and observation. During this comment they are looking at the patient and then at the students around the bed, almost as though they are seeking that information. There is a clear recognition that the patient has the answers if you know what to ask and how to interpret the information and the emphasis within the utterances is the need for information in order to hypothesise and make a decision. Each of the experts identifies the salient points, and whilst they use different language, they have all drawn on their experience and shown appropriate and accurate clinical reasoning.

The novice group make fewer comments during this segment and focus on what they are seeing and identifying some of the salient points, i.e. chest pain. Four of the novices comment on the chest pain and clearly recognise it as important but only participants N4 and N5 appear to appreciate the significance of this.

N4 (15): *don't want fluids if he's got cardiac chest pain as it puts more pressure on the heart*

N5 (21): *they need to stand back and talk to him a bit more but if he's getting short of breath he might be having another MI in which case they do need to get on and find out what's wrong but at the same time I think he's panicking*

In both comments the clinical reasoning is evident and both are identifying an important cue; that the patient is experiencing shortness of breath, hypothesising that he may be having another myocardial infarction. In these two comments both viewers are showing not only that they have

recognised what is happening, but also the potential for the patient's condition to deteriorate. They are drawing on specific knowledge to make their comments, weighing the cues and making a judgement as to what they believe may be occurring.

7.2.2.1 Descriptive Statistics Segment 2

Watching the eye movement during this segment it appears that all of the viewers are moving between the students and the patient, and when the patient becomes the centre of the screen their attention is drawn to him. During this segment movement of the students and nurse in and off screen draws their attention, but there are no comments on this movement. The focus of both the heatmaps and saccades show that the focus is on AOI2, and this is reflected in the descriptive statistics of the novice (Table 29), with AOI 2 drawing the first fixation and having the highest means in terms length, count, observation length and observation count. This is replicated in the experts (Table 30), although the first fixation is on AOI4 here. This may be explained by the calibration sensitivity as when watching this segment the fixations are clustered at the boundary of AOI2 and AO4.

Table 29: Descriptive statistics novices segment 2

	Mean	Std. Deviation
AOI 1 Time to first fixation	6.63700	5.863102
AOI 2 Time to first fixation	1.95540	2.444264
AOI 3Time to first fixation	1.92230	3.549970
AOI 4 Time to first fixation	16.48320	17.213904
AOI 1 First fixation duration	0.60240	0.747132
AOI 2 First fixation duration	0.23890	0.245682
AOI 3 First fixation duration	0.31430	0.361664
AOI 4 First fixation duration	0.30290	0.307422

Table 30: Descriptive statistics experts segment 2

	Mean	Std. Deviation
AO I 1Time to first fixation	4.06722	4.997725
AOI 2 Time to firs fixation	1.81244	2.714113
AO I3 Time to first fixation	3.17267	6.101202
AOI 4 Time to first fixation	5.63489	7.722854
AOI 1 First fixation duration	0.31256	0.317146
AOI 2 First fixation duration	0.27311	0.243638
AOI 3 First fixation duration	0.24867	0.269780
AOI 4 First fixation duration	0.36822	0.446468

7.2.3 Segment 3

Segment 3 starts with the patient complaining of 'feeling weird' and the students in the video have already decided that they need support from both the nurse and the doctor. With one student off screen on the phone to the doctor, the other two students and the nurse are attending to the patient in various roles. At this point the viewer has watched 11 minutes of the video and has therefore been able to gather information about the patient's condition and potentially hypothesise as to what may be about to occur. This segment lasts for four minutes and was designed to encompass the cardiac arrest that allows the viewer to comment on both the actions of those in the simulation, as well as their interpretation as to what may be occurring. In phase one the patient underwent a controlled defibrillation whereas in this video it was an unplanned event and therefore also of interest as a comparator.

During this segment a lot is happening both visually and aurally for the viewer to consider; there is movement around the bed, physical interventions with the patient, and discussions occurring as to what may have happened. Even for the experienced viewer this is a busy scene, and whilst it offers a lot to comment on, it also demands attention.

The novices' utterances focus on the performance of the students and what they are seeing, not appearing to pay attention to what is being discussed. They are aware of what basic life support should look like as they have learnt and rehearsed the skill prior to their first placement and they appear to draw on this knowledge to critique, offering both positive and negative utterances.

N4 (30): *compressions look slightly too fast*

N5 (32): *that's good speed*

N7 (31): *and they're taking turns so they don't get tired and their compressions are effective*

The experts again draw on their knowledge of the clinical skill but their utterances contain much more than pure description, identifying potential causes, and critiquing the skill and the decision making that is occurring.

Ex3 (70): *right so they've picked up what 4 H's and 4 T's are and they've gone for the low one, hypoxia, hypotension, so he had a low potassium earlier so they're helping work through the 4 H's and they've got fluids running so they've got another nurse has taken over compressions, these look much better, quality compressions*

Ex4 (44): *one of the nurses almost doesn't look as though she knows what she should do but now she's taken over again so really good communication there to notify each other when they're getting tired and to relieve each other of the roles*

Ex8 (40): *can't see at the head end whether they've got a head tilt chin lift on and if they're using an ambu bag as a single person an inexperienced user that's not great, can't see if they're getting any effective ventilations.*

In the comment from participant Ex8 above, the viewer is not only looking to critique the performance of the student attempting to deliver the ventilations but is also looking to confirm whether this is being achieved through the rise of the chest. They are drawing on their own experience to confirm the actions, critiquing what they are seeing and making the link between action and outcome.

7.2.3.1 Descriptive Statistics Segment 3

In segment 3 there is a difference in the focus between the novice Table 31 and experts Table 32 with novices focusing on AOI 3 and experts AOI 4. During this segment AOI 2 includes the oxygen and is above the patients head with AOI 4 including the patient's chest. Again this may be due to calibrations sensitivity although when watching the segment the novices do focus on spend a significant time looking at the lower part of the patient's chest which is at the boundary of AOI 3 and AOI 4. Here they are just able to see the nurse at the end of the bed who is directing the cardiac arrest whilst they are also able to see the compressions taking place. They appear to be directing their attention to the control element of the scenario here and as seen in segment 2 they may be allowing their focus to be the audible rather than the visual.

Table 31: Descriptive statistics novices segment 3

	Mean	Std. Deviation
AO I 1Time to first fixation	2.94320	5.351864
AOI 2 Time to first fixation	0.35780	0.847656
AO I3 Time to first fixation	12.30380	8.323590
AOI 4 Time to first fixation	9.13790	8.737094
AOI 1 First fixation duration	0.21210	0.127292
AOI 2 First fixation duration	0.40250	0.516446
AOI 3 First fixation duration	0.28810	0.179222
AOI 4 First fixation duration	0.28970	0.181893

Table 32: Descriptive statistics experts segment 3

	Mean	Std. Deviation
AO I 1Time to first fixation	6.30967	16.742719
AOI 2 Time to first fixation	10.84578	28.187686
AO I3 Time to first fixation	3.51433	3.370823
AOI 4 Time to first fixation	11.28178	28.029577
AOI 1 First fixation duration	0.18233	0.145700
AOI 2 First fixation duration	0.33622	0.214523
AOI 3 First fixation duration	0.31078	0.218022
AOI 4 First fixation duration	0.36311	0.328972

7.3 Analysis of the Verbal Utterances

The verbal signifiers previously identified were applied to the data collected through the experiment, with each utterance considered for its performative function. Whilst both groups are offering negative and positive comments utilising the same performative function, the content of their critique differs. Drawing on their knowledge and experience the expert group provide more in- depth and involved utterances. A new signifier emerged from the consideration of the larger data set; signalling experience through the use of knowledge and this is discussed later in section 7.2.

The number of utterances by the participants and theme is shown in Table 33 (experts) and Table 34 (novices) and from this it is clear that the concern of the novice group was primarily communication and nursing practice, both of which received the most comments. The counting of the utterances and classification in this way not only allows for illustration but also acts as a form of face validity, whilst arguably the most subjective in terms of validity, it does allow for transparency in how the performative utterances have been coded (Hardesty and Bearden, 2004).

Table 33: Verbal utterances by theme and performative function for each expert participant

Participant	Professional values		Communication and interpersonal skills		Nursing practice and decision making		Leadership, management and team working		Total	Total negative	Total positive
	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive			
E1	0	0	1	4	6	0	1	1	13	8	5
E2	0	0	5	5	9	10	3	3	35	17	18
E3	0	0	17	8	27	13	2	3	70	46	24
E4	5	0	6	3	24	9	2	6	55	37	18
E6	0	0	12	2	18	12	10	5	59	40	19
E7	1	0	5	2	16	5	0	0	29	22	7
E8	0	0	8	3	16	15	1	0	43	25	18
E9	3	0	12	2	58	4	12	4	95	85	10
E10	0	0	19	1	20	0	14	1	54	53	1
TOTAL	4	0	85	30	194	68	45	23	453	333	120
MEAN	.44	-	9.44	3.33	21.55	7.55	5	2.55	50.33	37	13.33

Table 34: Verbal utterances by theme and performative function for each novice participant

Participant	Professional values		Communication and interpersonal skills		Nursing practice and decision making		Leadership, management and team working		Total	Total negative	Total positive
	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive			
N1	0	0	3	0	24	1	3	0	31	30	1
N2	0	2	20	8	2	9	0	0	41	22	21
N3	3	0	24	1	1	2	4	1	36	33	3
N4	8	0	9	0	16	0	0	0	33	33	0
N5	1	1	16	3	6	4	2	3	36	25	11
N6	0	0	8	4	0	1	2	0	15	9	6
N7	1	0	9	7	8	5	0	3	33	18	16
N8	4	0	13	4	15	3	4	0	43	36	7
N9	0	0	3	0	0	0	1	0	4	4	0
N10	7	0	26	0	19	0	12	0	64	64	0
TOTAL	24	3	131	27	91	25	28	7	336	274	65
MEAN	0.24	.3	13.1	2.7	9.1	2.5	2.8	0.7	30.6	27.4	6.5

7.3.1 Signifying the 'Negative'

All the verbal utterances were considered for their performative function and examples are given from both the novice and expert groups to illustrate their use of language in signifying their critique of what they were viewing. Whilst the comments may differ, they all have a performative function in common although the main difference between the groups is the depth of knowledge that is demonstrated. These findings are discussed in depth in Chapter 8 and are offered here as illustrations to allow the reader the opportunity to both check the analysis and create their own text.

Statement of fact

Ex1 (1): *Ok, so they are all looking at the monitor and nobodies looking at the patient*

Direct approach filling in the gaps

Ex9 (75): *right you need to start chest compressions*

Ex9 (76): *right assess him assess him, assess him assess him is he breathing? is his chest? is there a rise and fall? so it's taken quite some time for someone to do that, right checking for rise and fall, right she's checking for a pulse at the same time from the looks of it.*

Correctional/improvement comment

Ex3 (39): *somebody's saying 'I've got palpitations', I would expect them to feel a pulse, I'm not sure but they're recognised they need to ask for help. I would be expecting them to feel for a pulse and check the rhythm when somebody says palpitations and check the rhythm when somebody says palpitations, I would expect them to collect another lot of information on the observations.*

Ex4 (6): *ok so they could think about some other things, position of the patient sitting the patient up.*

Ex7 (16): *if he had a catheter in situ might be worth looking at that and certainly they are missing looking at the prescription chart, looking what he had last and when and whether there's anything they could give him and would also advise them about the oxygen mask possibly.*

Ex4 (32): *but no one's thinking about the equipment though, that's surprising, think about the equipment that can help you airways and things like that no one's thought about just yet*

Supposition

Ex8 (19): *they're looking for guidance from the doctor, a bit unsure in their posture and body language*.

Ex9 (23): *they're passing the stethoscope around but whether they know what they should be listening for and where.*

Ex10 (32): *O.K. so they missed all the signs*

Questioning

Ex2 (43): *so who's taking the lead?*

Ex3 (6): *they're giving oxygen will help with breathlessness, mmm, don't know about the evidence base for that one*

Ex7 (20): *I don't understand why they want to give him fluids, I haven't heard exactly what the blood pressure is, I think I can hear he's tachy but I haven't heard what the blood pressure is, presumably I've just missed that*

Signifying the 'positive' Confirmation of the behaviour

Ex3 (8): *so putting the oxygen mask on, she's obviously done that before because she made sure she didn't get the erm, strap over his eye*

Ex6 (30): *ok so not breathing appropriately she's gone straight into chest compressions which is the right thing to do given that she hasn't made any assessment of circulation at this point*

Ex8 (15): *good that they're checking on the breathlessness sand any response to treatment*

Statement of fact

Ex4 (18): *now they're doing a much better assessment they're making a good of the patient's skin abdomen areas so they are clearly thinking about what could be contributing to his observations*

Ex7 (15): *checking whether he's comfortable in his present position*

Judgement

Ex4 (9): *so it's good that they're checking they're looking at the monitor and doing a check of the pulse to check it's irregular*

Ex6 (11): *like the fact that she's not been doing an awful lot but she certainly had a look at his feet and felt his feet which shows she is thinking about a wider cardiovascular assessment*

Ex9 (95): *so since [doctor] come in everything's calmed down there's a process everyone knows their place even the person who's not doing anything is waiting to be instructed*

Qualifying comments

Ex3 (21): *nobodies actually taking responsibility to actually communicate with the patient as such that might be because it's a mannequin, they are just responding to his question and not really taking control of him information and reassurance*

Ex4 (17): *it's interesting that they look quite a lot at the monitor erm when they have given some intervention to see if it's working rather than look at the patient and that again could be because he's a mannequin*

In the analysis of the data in phase one, an approach to signifying the negative was seen, that of 'interventional action'. Seeing this in the novice group would have been an unexpected finding but the expert group also did not use it here. This may be due to the instructions that the participants in phase one were given concerning the aim of the experiment during which the data was collected, as the participants were asked to consider competence of the students they were watching. Where they acting in the role of the mentor? This may explain the need for correctional language. The three participants in phase one were all experienced nurses who were involved in the mentoring of student nurses, and were therefore approaching the video from this perspective. In this experiment no such instruction was given and the participants were asked to comment on what they seeing without the framework of competence or mentorship.

7.3.2 Drawing on Knowledge to Signify the Performance of the Utterance

Whilst all of the participants were viewing the same video, the manner in which they interpreted what they were seeing differs, and this is shown in their verbal utterances. On examination of the verbal utterances from the experts it became apparent that they were not only describing what they saw but also offering an interpretation based on their knowledge and experience. At times the viewer would comment directly on the cues from the patient, for example:

> *"He's very tachycardic so MEWS wise he ought to be altering them to the fact that they need to get help I think."*
>
> Participant Ex2, comment 14

Here the viewer is identifying that the patient's physiological signs are of concern and that the use of an appropriate tool (in this instance the Modified Early Warning Scoring system, MEWS) should be alerting the students to this fact. The viewer is not only drawing on their experience through pattern recognition and salience, but also providing a prediction of the future that the patient's condition is deteriorating. At this point the students have the information but have not yet processed it and come to this decision. The viewer uses recognisable shorthand in the use of the term 'MEWS', offering this as a tool, which has embedded power in the interpretation of the patient's physiological signs and the actions required. The use of such language demonstrates this viewer's understanding of both physiology and clinical practice.

On other occasions, the viewers would directly critique the behaviour and actions of the student:

> *"so they're the doctors going through airway breathing circulation, the mentors got eh adrenaline that they've given they are being hesitant giving the compressions and there doesn't seem to be any team work going on."*
>
> Participant Ex3 comment 65

The viewer is offering both a description of what they are seeing and a critique of the student's performance, drawing on their knowledge to interpret what is happening and what should be happening. Teamwork is key in a cardiac arrest situation and the viewer is aware of this, and even though the students in the video have performed a number of appropriate actions, the viewer suggests that leadership is lacking. The viewer is drawing on their knowledge of physiology, clinical actions, and decision-making to form their own patterns or schemas that they are judging what they see against. The following examples, taken directly from the data, illustrate this and are discussed further in Chapter 8.

Ex2 (20): *ok, so they're reassessing him that's good and they're using the ABCDE format and they're reviewing the information that they've got and what's changing which is good, they need help*

Ex3 (19): *they haven't got much of an idea about how they're going to gather the information about the cause of breathlessness is, they sort of manage the symptom but they're not doing the diagnostics, having to be pushed into that so they don't have a pattern they have understood*

Ex6 (23): *so he's deteriorated but apart from doing his blood pressure they are asking questions about not going into detail about quality radiation things like that*

Ex8 (18): *no attempt to use a pain assessment tool like OLDCART or make an assessment of pain severity using a pain score*

There was no evidence of such summation in the novice participants.

7.3.3 Hearing the Unspoken

Whilst listening to each of the videos with the participants' verbal utterances it became clear that it was not only what was being said that needed noting but also the sense of feeling and emotion that was evident in the voice. This was particularly evident in the novice group, who when perceiving what they were seeing was not correct, became frustrated and unhappy as can be seen in the comments below.

N2 (43): *ok he's stopped breathing (laughs) they hadn't noticed he's very quiet they're too busy trying to pass information over onto the phone, they've put the bed down [notation from transcription the participant laughs here, is this in response to the surprise that the patient has stopped breathing or that they hadn't noticed and this has a comedic value?]*

N3 (15): *again she's pulling down the gown she's pulled down the gown without asking again or informing notation from transcription: student sounds unhappy and frustrated, they are not seeing what they expect to see*

N7 (28): *yes as I said don't get distracted by the apron just keep it going notation from transcription: student sounds frustrated with what is happening, they have already commented on the fact that they need to continue compressions and this is now distracting them and the patient is not getting the care they need as a result*

N10 (45): *this poor, poor man I know it's only a mannequin but you know what I mean, he was telling them all of this he was telling them he had pain*

[Notation from transcription: throughout this student has been disparaging about what they have seen and this is one of the final comments. The student seems to have emotionally engaged with what they are seeing and is highly critical of the student's performance. There is a belief here that I as the transcriber and researcher will understand what they are saying and agree with the viewer, they appear to believe that I will also hold the same values and interpret what is happening in the same way]

This degree of emotional involvement is not as evident within the expert group, although when the cardiac arrest starts participant Ex9's voice does start to show sounds of frustration that things are not happening as quickly as they could, and they begin to talk at the students in the video. Listening back to the semi-structured interviews this is evident in both the emotional prosody (intonation and emotion) and also the language used.

SF: *What did you think about the students?*

N3: *not sure, I mean is they did some things well but other….like the gown, why were they looking under it all of the time? It didn't make sense, but then we haven't done anything like this yet*

This was most evident in participant N10, whose responses within the interview mirrored their emotion in the verbal utterances:

SF: *so how was that?*

N10: *interesting, I mean they were rubbish, what year were they*

SF: *actually they were year three students*

N10: *really? [laughs] I can't believe it, what have they been taught?*

SF: *could I ask you to expand on that please?*

N10: *well, I mean they never talked to the patient, you have to talk to your patient and when he crashed they didn't know what to do, it was chaos like none of them had done it before and we get taught that. But they needed to talk a lot more to the patient, God help me I want to be better than that*

Even during the semi-structured interviews these participants drew on the same examples they had given through their verbal utterances, drawing on the rules that they held.

Ex10 (89) *stand clear*

Ex10 (90) *no stand clear [notation from transcript: almost shouting here and in previous comment, clearly frustrated with what they are seeing and they are right that the students are a little close at times to the bed. It is almost as they have put themselves in the scenario and have taken responsibility for the safety of the students*]

The emotional prosody adds to the interpretation of what is being heard and enhances the performative utterance. It is not only evident in the verbal utterances but the semi-structured interviews as well, where although the same degree of emotion is not present, the judgements remain.

SF: *how do you think the students did?*

Ex10: *they were ok, they seemed to know some of what they needed to do but they needed to be talking to the patient at lot more, taking notice of what he was saying, thinking*

SF: *could you explain that a little more?*

Ex10: *O.K. well when the patient arrested, that was quite obvious it was going to happen and they didn't see it. If they had thought about what the patient was saying they would have picked up on it. I mean I know it's simulation but it was all there.*

7.4 Combining the Data

The use of segments enables the combining of both the verbal utterances and the eye movement, thereby allowing for an in-depth exploration and analysis, and the development of theories. The segments developed for the purposes of the experiment centred around three key points in the video and were identified to support the achievement of the aim. However, the segments were not considered in isolation and the watching and note taking for each of the videos for each participant in their entirety facilitated the emergent themes and ideas that came from the segments to be explored in the rest of the data.

An important step was the consideration of how the verbal data and the eye tracking data from each participant worked together. Watching the videos for each participant with the thinking aloud commentary and the eye movement playing allowed for notes to be taken and correlations to be made between the two data sets for each participant. This meant that questions about what the participant had been saying could be considered within the context of what they had just seen or where looking at. This process supports the validity of the conclusions drawn.

7.5 Achieving the Aims and Objectives

The aim of the experiment was to articulate the characteristics of the nursing gaze through the analysis of the eye movement and verbal data obtained through the application of the experimental methodology. In order to achieve this three objectives were identified: (1) to create and conduct an experiment which utilises the level of experience as the independent variable to identify the perceptive and cognitive elements of the nursing gaze through the analysis of eye movement and verbal data; (2) to assess the validity of the methods of data collection in capturing the nursing gaze through a comparison of the findings from each data set; and (3) to assess the validity of the analysis that has drawn on ethnographic techniques to the data collected through the recording of eye movement, verbal utterances and semi-structured interviews. The outcomes of these objectives are presented here.

7.5.1.1 Objective 1

To create and conduct an experiment which utilises the level of experience as the independent variable to identify the perceptive and cognitive elements of the nursing gaze through the analysis of eye movement and verbal data

The experiment was designed as a one armed study using level of experience as the variable. This was identified through the development of a conceptual framework of the nursing gaze and an appreciation of the literature concerning exploratory experiments. Ethical approval required careful consideration of how the participants from the video would be protected and this was gained from the author's University.

A review of the literature led to the development of general exclusion criteria in order to ensure the safety of participants, asking them to self-exclude due to the potential sensitivity of some of the conditions where eye tracking may pose a risk. Participants were purposefully selected for the expert group by employing a gatekeeper, while the novices were self-selected after information was given to all of the potential participants. Data was then collected over a two-month period with one failure in capturing the eye tracking which resulted in participant Ex5 not being included in the study.

7.5.1.2 Objective 2

To assess the validity of the methods of data collection in capturing the nursing gaze through a comparison of the findings from each data set

The review of the literature and knowledge of the available technologies led to the hypothesis that the nursing gaze could be articulated, seen and handled. The analysis of the data presented in Chapter 4 allowed for the development of gaze-to-text. Drawing on ethnographic techniques and placing the viewer as the negotiator of text allowed for the exploration of their knowledge construction.

Both the eye movement and verbal utterances of the participants provided data for analysis, and drawing on the principles of applied thematic analysis, three segments for in-depth consideration were identified. Each of the segments' associated data was analysed using proven methods and the addition of the GPA software supported the exploration of the eye movement. The identification of areas where the eye movement within and between the two groups showed close similarity supported the conclusion that both groups looked at the same thing, but interpreted it differently.

7.5.1.3 Objective 3

To assess the validity of the analysis that has drawn on ethnographic techniques to the data collected through the recording of eye movement, verbal utterances and semi-structured interviews

The coding structure applied to the verbal utterances allowed for a simple quantitative analysis of the verbal utterances. Each of the verbal utterances for each participant was coded by timestamp and recorded against the action in the video. Themes were then developed and applied to the verbal data exploring the performative function and summation, whereby the utterance has meaning greater than what is said. The eye movement for each participant was watched and notes taken during each of the identified segments. This form of turning eye movement into text permitted a qualitative approach to be employed, thus overcoming the limitations of the software and also allowing for a greater immersion in the data (gaze-to-text). Bringing all of the data sets together supported the validity of the findings and offered an opportunity for triangulation, thereby increasing the validity of the interpretations and final conclusions.

The use of semi-structured interviews allowed for the participant as viewer to comment on the whole with hindsight, placing what they have seen in the context of the whole. Having experienced the watching they had negotiated the text and constructed knowledge. Revisiting this immediately after watching the video enabled the validation of their own knowledge and judgements, whilst also providing the opportunity for a discussion of what they had seen. This supported the results not only by validating my negotiation of the text, but by also generating slightly different information, thus allowing for unpacking of the meaning (Green and Thorogod, 2009). Member checking took place with two of the participants from the novice group and three from within the expert group. These informal conversations were started by the participants and yielded an unexpected opportunity to discuss my interpretations having listened to their thinking aloud by that point. I had not thought to formally member check as I had the semi-structured interviews, but this offered an opportunity to explore the credibility of my interpretation. All three participants confirmed that my impressions (at that time formal analysis had not taken place) were correct. Whilst a formal member check as described by Birt et al. (2016) had not taken place, the informal nature of the follow up conversations allowed for probing.

As found in phase one of the study, the verbal data proved to be the most valuable in the analysis, allowing for the confirmation of the performative utterances and providing insight into the rules of the gaze through the comparison between novice and expert nurses. This was further supported by the identification of the emotional prosody during the analysis of the verbal utterances that provided a further dimension adding additional insight into the nursing gaze. The

performative function of the utterances is strengthened when the emotional intent is also considered. This supported the identification of the rules of the gaze through hearing the negativity and sometimes anger when these rules were not followed. Differences in the engagement with the video were evident between the two groups, with the novices having a higher degree of emotional involvement with what they are seeing.

The use of segments allowed for an in-depth analysis of the eye movement and verbal utterances of the participants in the experiment. It is evident that there are characteristics associated with the level of experience of a nurse and that these can be identified in their eye movements and verbal utterances whilst watching a video of simulated practice. These differences are most evident in the verbal utterances, whilst the eye movement shows greater similarities between the two groups.

7.6 Chapter Conclusions

Chapter 7 has presented the results from phase two of the experimental study. Data from each of the three identified segments were subjected to the planned analysis, utilising gaze-to-text to achieve the aims and objectives set out in Chapter 6. Chapter 8 draws the conclusions from the first phase of the study together with those from phase two to draw the final conclusions of this study and considers the initial research question discussed in Chapter 1.

Chapter 8 - Discussion and Conclusions

8.1 Chapter Introduction

This study set out to analyse and name the nursing gaze and to achieve that it required the identification of tools in order to do so. The preceding seven chapters have provided the journey to this point, offering a theoretical stance in Chapter 1, a review of the literature in Chapter 2, a debate of the methodological considerations in Chapter 3 that led to the testing of the tools in Chapters 4 and 5, and the experiment in Chapters 6 and 7. This final chapter draws on each of these preceding chapters to discuss the findings from both phases of the study in order to reach conclusions and recommendations for policy, education and research. It begins by revisiting the nursing gaze and the research question and considering how each of the research aims has been addressed. The novel contributions that this thesis makes to the body of knowledge are presented with recommendations for future research.

8.2 The Experiment

At the beginning of this study I argued that there was such a concept as the nursing gaze, and I set out to explore this through the development of a two-phase study focused on addressing the question:

> When watching a video of simulated nursing practice, can the cognitive and perceptive elements of the nursing gaze be articulated through the comparison of novice and expert nurses' eye movement and verbal utterances?

The two main components of this question ask: (1) what is the gaze; and (2) how can it be identified? These questions have guided the development of this work, demanding that attention be paid to the tacit nature of the gaze and how this may be explored. Based on the literature presented in the initial three chapters of this work, I hypothesised there were three potential outcomes when using eye movement and verbal utterances to uncover the nursing gaze:

1. That there would be discernible differences in the eye movement and verbal utterances between novice and expert nurses
2. That there would be no discernible difference in the eye movement but that there would be in the verbal utterances between the novice and expert nurses
3. That there would not be a discernible difference in the verbal utterances but that there would be in the eye movement between the novice and expert nurses

Revisiting these now, I need to add the word 'significant' to discernible differences, particularly when considering eye movement. As will be presented in the following sections, the conclusions are based on the synthesis of what has come before, identifying the characteristics of the novices' nursing gaze and that of the experienced nurse.

8.2.1 Experience as the Independent Variable

In Chapter 1 I argued that the level of experience would be an important variable in exploring the nursing gaze, and in section 2.4.2.1 I presented predictions as to how the eye movement and verbal utterances would present at each level of skills acquisition. These predictions have borne true, although as will be seen in this chapter, the nuances within the groups demand reconsideration. In Chapters 6 and 7, the data from two distinct groups, novice nurses and expert nurses was considered and analysed separately, with each individual participant's data being analysed separately and then brought together within the identified group. This grouping enabled conclusions to be drawn from the findings of each individual within the group and themes developed and interwoven.

When coding and applying themes to the verbal utterances ideas started to emerge about what I was reading and hearing, and once I had coded all of the data I began to see patterns within the groups. The experts were offering a higher level of critique and demonstrating their knowledge and awareness of the situation through their utterances, whilst the novices focused on communication and offered a superficial commentary.

Revisiting the data for the second time it became apparent that there were possible outliers or subgroups that were seen and heard in the verbal utterances, and further exploration was needed. In the novice group participant N4's verbal utterances stood out, as they were using language and showing pattern recognition that was more representative of the expert group.

> *"Used to see this all the time, patients with chest pain, you think about the obvious, you need the information to ring ahead"*
>
> Semi-structured interview N4

As seen in the biographical data presented in Table 26, participant N4 had spent three years in a pre-hospital setting and now appeared to be drawing on that knowledge to move past the rules governing the novice. This may explain why the focus of participant N4's comments in segment one are about the need to perform additional tests and that the students have not completed the assessment as they have missed an element. They are not only identifying the gaps but also drawing on their experience to hypothesise as to what may happen next and the information needed to make the decision as to how to act. When the comments from participant N4 were

considered as a whole, then it was clear that they were drawing on this experience whilst watching the video.

Within the expert group the initial coding identified that the experts' utterances were as expected, with evidence of experience through holistic pattern recognition, hypothesising and critique. The majority of the characteristics of the eye movements and verbal utterances were shared with other members of the expert group although those of participants E 9 and Ex10 stood out. When experience was considered as the variable then it was revealed that participant Ex9 had four years' clinical experience prior to their current role, the least amongst the expert group, and when considering the transcript of participant Ex9's utterances the first thing that came to mind was their superficial nature. Having read through and made initial notes on seven of the expert group's transcripts, I was expecting to see holistic pattern recognition, use of experience embedded within the utterances, and critique of both the performances and the situation, but what I was reading for participantEx9 felt superficial and descriptive. Participant Ex9 makes 104 comments whilst watching the video, all of which have a negative performative function, with 30 of these within the third segment. During the first 30 seconds of segment three participant Ex9 comments:

Ex9 (74): *right, they're not, nobodies pulling together to look at what he's saying right he's' stopped breathing as they're not looking straight down bed out bed out*

Ex9 (75): *right you need to start chest compressions*

Ex9 (76): *right assess him assess him, assess him, assess him, is he breathing? Is his chest? Is there a rise and a fall? So it's taken them quite some time for someone to do that, right checking for rise and fall, right she's checking for a pulse at the same time for the looks of it*

The frustration is apparent in participant Ex9's voice when listening to their utterances, which is in contrast to the remainder of the expert group aside from participant Ex10. During the semi-structured interview participant Ex9 stated that they had never been involved in a cardiac arrest in clinical practice but had during simulations such as this as part of the teaching team.

Participant Ex10 had seven years of clinical experience, one year as a registered nurse and six years as a midwife. The first comment that participant Ex10 made during segment three was:

Ex10 (36): *Ok, so they have missed all of the signs*

When looking at the entire transcript of their utterances there were no comments that suggested that participant Ex10 has considered what may be happening or be about to happen to the patient, and during this segment their comments are in the form of questions

Ex10 (33): *So has anyone called for help?*

Ex10 (34): *Right so who is coordinating this?*

Ex10 (35): *Who's the lead?*

Ex10 (36): *Who are they handing over to?*

Ex10 (37): *Why's that person stood there looking?*

There is recognition from participant Ex10 that there is a need for lead and coordination, but this appears theoretical rather than from practical experience. During the semi-structured interview it became apparent that participant Ex10 had previously been involved in a cardiac arrest but not for over 15 years (their estimate) and had only seen one. Therefore their knowledge was based on limited clinical experience and they appeared to retreat to novice rule governed behaviour. Considering all of the verbal utterances from participant Ex10 over the entire video, their comments are descriptive, offering a superficial narration of what is happening, using both questioning and the statement of facts. Both participants Ex9 and Ex10's utterances also reflect those of the novice group more than that of the remainder of the expert group with negative performative functions.

In Chapter 1 I set out the hypothesis that experience would be a key variable that would allow the identification of the elements of the nursing gaze. Drawing on the work of Benner (1984) Dreyfus and Dreyfus (1986), I identified two groups, novices and experts based on the characteristics described in Chapter 4. Reconsidering this now this self-reported expertise requires greater consideration in regards to the situation and context in which these experts had gained their experience. The data within both phases supports Benner, Dreyfus and Dreysus' as well as Hoffmans work that situational and contextual experience is of significant importance in determining the degree of skill. This is an are a worthy of further study and the methods employed within this study have proven their worth as tools in enabling this.

8.2.2 Areas of Alignment in the Eye Movement of Both Novices and Experts

At the beginning of this study the literature review suggested that there would be clear and distinctive patterns of eye movement between the expert and novice participants; however, this has not been the case. The use of the GPA software allowed the eye movement for each group of participants to be brought together and areas of convergence identified. The graphs produced showed both areas of convergence between the participants within the novice and the expert group, as well as areas where there was divergence.

It was noticeable that in both groups there was little convergence when the action on the video was off screen. This may be because the viewer has nothing to focus on to explain what they are hearing and therefore their eyes wander. The similarity between the groups is that there is a lack of convergence within each, and the differences in eye movement during this time did not appear to be related to the level of experience of the participant. Rather, during this time all the participants were scanning the scene with shorter fixations and no obvious pattern until they converged when the student returned to the screen. This is indicative of the viewer's attention being drawn to the audio rather than the action on screen (Cooper, 1974).

When the graphs of both novices and experts were considered side by side then these downwards peaks were similar, and occurred around events such as the arrival of the nurse and the removal of the oxygen during the cardiac arrest. Both of these scenes involved obvious behaviour that attracts the attention of the viewer and demands noting. The review of the literature suggested that there would be differences in the eye movement patterns of novices and experts (Jarodzka et al., 2010; Balsev et al., 2012; Crespi et al., 2012; Betram et al., 2013; Browning et al., 2014; Suetsugu et al., 2016). However, this has not been the finding within this study; rather there have been similarities in the pattern of eye movement. I believe that this is due to the movement of actors (I use this term to address everyone within the video) and action within the action and it is this that is demanding attention. The literature drawn on in Chapter 2 suggested that the task is key to eye movement, and the dynamic state of actors within the video used here means that this takes precedent for the viewer. They were also given an open task as the viewers were not asked to diagnose the patient or make a decision on the competence of the students, and it was a contrived task (Hoffman et al., 1995) which lacked boundaries. This was purposeful as I did not want to direct the viewer as I wanted a natural response to what they were seeing and hearing, I wanted their own negotiation of the text (Martinez, 1992). During the analysis I negotiated the texts that had been created through the qualitative interpretation of the eye movement and the verbal utterances, thereby constructing my own knowledge.

When considering the descriptive statistics presented in Chapter 7, it was clear that there were some differences in the fixations between novices and experts; however, the small numbers and large standard deviations demand caution in interpreting these results. In the first segment the novice's time to first fixation is longer than the experts and this may be explained by the views attention being drawn to the audible rather than the visual and familiarity with the scene. The expert's with more contextual knowledge require less orientation to the scene than the novices. In segments one and two both novices and experts appeared to concentrate on AOI 2, which is the section of the screen where the patient's head and chest can be seen. In segment three the experts spent longer on AOI 4, whilst novices again spent time on AOI 2. When watching the

video to determine why this may be it appears that the experts are spending longer during the performance of the cardiopulmonary resuscitation watching the action at the patient's chest and looking to the nurse at the end of bed in position three, which is on the limits of AOI 4. Without asking the viewer what they were looking at, in effect offering cued retrospective analysis, the conclusions are drawn based on the interpretation of the data.

Watching the videos of each of the participants a number of times and taking notes allowed for the iterative development of codes and theories. What became clear was that there was more than the traditionally reported descriptive statistics could tell me; I needed to draw on my own experience to see the unseen. The use of both GPA software and the descriptive statistics from Tobii TX provided confidence that the areas I was considering where appropriate and meaningful to the viewers.

8.2.3 Seeing the Unspoken

In the analysis of the phase one data presented in Chapter 4, viewing the eye movement during the moments prior to the defibrillation led to the observation that one viewer was undertaking a safety sweep. As the video used in the experiment also included the patient receiving defibrillation, each video was viewed with the viewer's eye movement overlaid to determine whether this was also evident here. Whilst there appears to be elements of the safety sweep for each of the viewers in the experiment, none were as pronounced as that previously seen. There are a number of possible explanations for this. The most probable is that the usual safety protocol with the oxygen removed from the patients face as soon as the defibrillator is being charged does not happen. In the video , The nurse removes the oxygen at a late stage and this is the only obvious movement at that time in the scene. It is noticeable when watching the eye movements of each of the viewers that they look at the oxygen as soon as the nurse moves to take it away, although only participant Ex6 comments on its presence prior to this.

Ex6 (39): *oxygen, get the oxygen*

Whilst the automated external defibrillator (AED) is charging the oxygen remains on the patient's face, not a concern at that time, but this becomes a problem when the shock is about to be delivered, and at this point the nurse appears to notice it and moves from the far side to grab it away. It is quite an exaggerated movement and was noted by one novice and one expert although the eye movement during the seven seconds shows that all the viewers have seen it (examples shown in Figure 44 and Figure 45).

Ex3 (62): *right, so they are responding to the direction from the doctor, they've got the defib on right so they have been told that there's a shock advised, stay, one one*

girl wanted to go and put that put the oxygen away she also threw the apron away the girls at the head of the bed has now decided to put an apron on

N2 (57): *oxygen was left on while they were charging*

Figure 44: Eye movement of participant Ex6 during the removal of oxygen

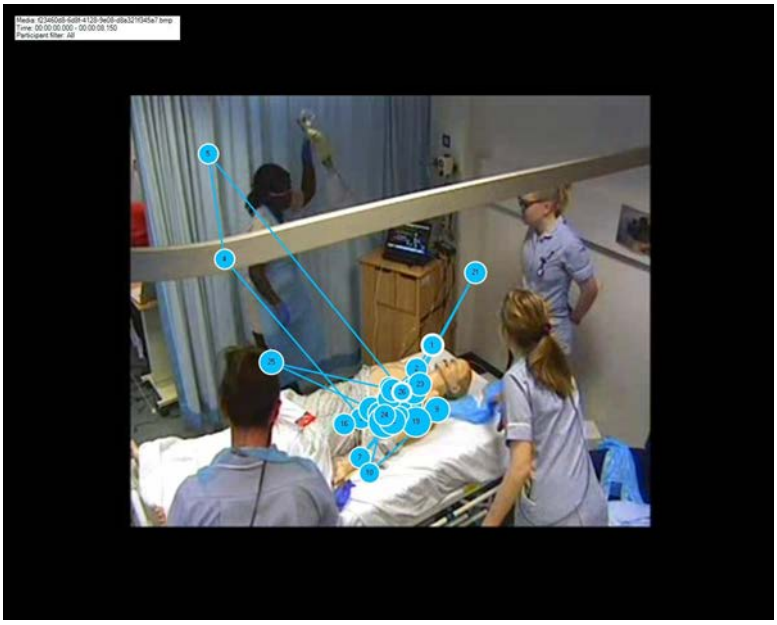


Figure 45: Eye movement of participant N2 during the removal of oxygen

Participant N4, the most experienced novice, commented on the safety element of defibrillation but rather than mentioning the oxygen she refers to the student who removes her apron just before the shock is delivered to make their point:

N4 (33): *the nurse pulled the apron away which put her at risk of being shocked*

The defibrillator used in the first video is a manual one (not an AED) requiring that the operator holds the paddles onto the patient's chest, thereby offering a much more visual clue as to what is happening, whereas in the second video a hands free defibrillator is employed. This alters the dynamic between the viewer and the person using the AED, as there are less visual clues that the shock is about to be delivered. The AED emits a high-pitched noise to indicate that it is ready and then the user presses the button when they are ready. All the viewers fixated on the defibrillator and returned to it during the segment when it was being actively used. There are 23 seconds in this segment where there is no action, between the AED advising shock and it being delivered. During this time the viewers' eye movements are shown to be scanning between the students visible in the segment and the patient's chest. They appear to be watching and waiting, as even though at the end of this the nurse pulls away the oxygen and a student an apron, only three viewers comment on this action. During this scene the doctor is asking the students about the patient's medication and whether he was given his usual dose of Furosemide[2] that morning. The doctor is clearly attempting to identify the potential cause for the patient's cardiac arrest and a part of this is gathering such information.

In section 5.2.5 I reported on the observation that one participant appeared to be conducting a safety sweep, a behaviour associated with the events that were occurring at the time, although they did not make reference to this. There was evidence in the other two participants that this may also be occurring and in phase two this was again looked for. This time there was no such overt pattern but the participants did appear to focus on safety and the different equipment used in the scenario may account for this difference. In the video used in phase one the patient requires a controlled cardioversion. This is an electric shock applied to the chest using a defibrillator and which involves the user holding pads on the patient's chest with another operating the defibrillator. The person holding the pads is responsible for safety and to do this they shout 'stand clear, oxygen away, shocking', during which time they will look to each of those around the bedside to check that they are safely away before delivering the shock. The position of the person holding the pads means that this is an obvious action, but in phase two a hands free defibrillator is used. No longer is someone holding pads on the chest showing very clearly what is happening, as instead the pads are held on the chest by an adhesive and the defibrillator is a much smaller box that is placed on the patient's bed. In addition, it is no longer the responsibility of the operator to determine whether a shock is required, only to deliver it. The AED analyses the heart rhythm and if it is determined that a shock is advised will display this, then announces stand clear whilst it charges. Once charged the operator presses the button to release the charge during

[2] Frusemide is a medication given to people who have too much fluid in their circulatory system that is putting undue pressure on their heart. The omission of Frusemide in this instance has meant that the patient is experiencing a cardiac event.

which time an audible tone is heard. The requirement for safety remains but the choreography associated with it has changed, and this is reflected in the eye movement of the participants in the experiment.

In the video used in the experiment the oxygen is left on the patient's face whilst the defibrillator is charging, not a problem at that point but if left when the charge is delivered it could create a fire via any spark from the defibrillator. Just before the shock is delivered the nurse sees it and removes it from the patient's face with a very obvious grabbing motion. This draws the eyes of all the participants in the experiment, evident when watching the eye movement. Whilst they did not all comment on it, it is clear that they have seen this as their attention has been captured in their eye movements but it appears for many to be an unconscious adjustment, bringing the area into foveal attention. There are two explanations with regards to what is seen here as eye movement is only an indicator of what the viewer found of interest and does not show their perception of what they have seen.

For those who comment on the oxygen after the event, it is clear that they have seen and recognised the importance of this event. Those whose eye movements suggest that they have seen this but not commented on it may be explained through a lack of knowledge, distraction as they are considering and speaking about something else, or that they have not consciously seen this. However, all the participants' eye movements follow the nurse snatching the oxygen and swiftly drawing it away above her head, suggesting that this movement is what has caught their attention and that they are directing their attention to this movement (Duchowski, 2007; Holmqvist et al., 2011). The second explanation is that the change in the defibrillator and the associated differences in its use do not provide the visual cues that were evident in the first video, as no longer is it so obvious that a person is about to be defibrillated as there is no one holding pads to the patient's chest. During the time that the AED is emitting an audible tone, all of the participant's eye movement fixated on it, indicating that their attention had been obtained by this noise but again it is not explicitly commented on. This is an indicator that whilst the viewer has 'seen' the action they have either not valued it or chosen not to comment on it. This is where the combination of eye movement and thinking aloud offers an opportunity to see what the viewer has been looking at (Ericsson and Simon, 1993; Bojko 2005; Homqvist et al., 2011).

I know from my own experience of using both systems in clinical practice that the use of AEDs has altered how we act in cardiac arrest situations. There was greater room for error without this visual clue as to what was happening, and I myself was very nearly harmed when a doctor did not perform a safety sweep as previously presented, nor did they inform anyone that they were about to discharge the shock whilst I was in the process of securing the patient's airway. More luck than

judgement meant that I was safe that day, but this is something to be considered. If whilst watching a video with the purpose of critiquing what is occurring and the behaviours that are being seen are not leading the viewer to consider such elements, is this something that needs to be addressed? This is certainly a question for future research and with the increase in use of technology there is a need to consider and understand how we interact with such technologies (Elgin and Bergero, 2015; Grunerbal et al., 2015).

8.2.4 Breaking the Rules

Whilst listening to the voices of the novices while they were watching the video I was struck by how engaged they were with what they were seeing and hearing. At the beginning, they often sounded unsure as to what they were saying, but further into the video they appeared to become more emotionally engaged. No longer where they the detached observer but they were investing in the simulation, judging what they were seeing by their own standards and rules. When things in the video were not happening according to their rules then they became frustrated or even angry. The rules they had developed through their experience and that they had been judged by during their placement were not being met; the patient was not being communicated with and so he was being failed. Dreyfus and Dreyfus remark:

> The beginning student wants to do a good job, but lacking any coherent sense of the overall task he judges his performance mainly by how well he follows learned rules.
>
> Dreyfus and Dreyfus (1986, p.22)

This is evident in the utterances of the novice group, as they focused on the superficial elements that they were comfortable with and know the rules. The novices are applying their own understanding of the rules, unable to see how they may be met unless they explicitly adhere to what they hold true. Even those novices with previous experience in related fields have begun their socialisation in nursing, with the rules of communication and professionalism addressed and emphasised. Within the scenario the novices interpreted the behaviour of the students as breaking the rules, indicating this with language whose performative function signifies the negative:

N1(6) *that wasn't a very appropriate comment*

N7 (2) *I think the arms across the body are a little bit confrontational almost a bit guarded may be not making the patient feel as comfortable*

This is not only seen in the words, but also through the listening to the voice and considering the emotional prosody, attending to and deciphering the cues encountered. Whilst watching the video the participant is stimulated by what they are seeing and hearing, drawing on their own

experiences and beliefs in order to make sense of it. Their interpretation is not only heard in the words that they use and but how they say those words. By listening for the emotional prosody and combining this, final judgements were made, and it is possible to deepen the understanding of the message. The inclusion of the emotional prosody provides an avenue through which to explore the juncture of explicit and tacit knowledge, and in turn the nursing gaze. To achieve this requires that the person receiving the message must be able to understand it and the context in which is given. In this instance, as the researcher I was the receiver of the message, and all of the participants knew me and my clinical background as a nurse; therefore I hope that they trusted me to interpret the cues appropriately by drawing on that knowledge.

Revisiting the data from phase one I listened again to the verbal utterances and the semi-structured interviews and heard the same emotion in the voices of participants D and H, both of whom had judged the students as not achieving the level that they deemed to be competent. Drawing on the same performative words as those in the experiment, both these earlier participants appeared to have the same emotional engagement as the novices, although participant H in particular was an experienced nurse at that time. During the analysis of the verbal utterances participant H drew on hand hygiene as a vehicle for signifying the negative. Reading back now it felt as though this was a rule and that the students were breaking it, leading to participant H becoming frustrated, and in their own words during the semi-structured interview they stated: *"…very poor use of the hand cleaner which became a real bugbear of mine.*" Participant H was showing rules more associated with the novice and explicitly using these by placing themselves in the situation as the mentor. Was participant H taking on the role of the mentor whilst watching the video and unconsciously verbalising the rules of practice?

This form of placing the self in the scenario, acting as the mentor was also evident in the analysis of the data from participants D and E. From the analysis it is not only the experience, but also the task and role taken by the viewer, which influences the judgement of performance and the nursing gaze. As seen in the conceptual framework the role and purpose was deemed an important component, and whilst this needs further exploration it is a valid conclusion.

Rather than considering the whole in the manner that an experienced nurse does, the novice is identifying singular elements, with their focus on communication and its superficial performance, rather than the use of communication as a tool to gather information. As Dreyfus and Dreyfus state, novices are rule driven:

> During the first stage of skill acquisition of a new skill through instruction, the novice learns to recognise various objective facts and features relevant to the skills and acquires rules for determining actions based upon those facts and features. Elements of the situation to be treated as relevant are so clearly and objectively defined for the

> novice that they can be recognised without reference to the overall situation in which they occur. We call such elements 'context-free', and the rules that are to be applied to these facts regardless of what else is happening 'context-free rules'.
>
> Dreyfus and Dreyfus (1986, p.20)

From the consideration of the performative utterances, including the emotional prosody, it is possible to determine associated rules of communication and nursing practice, as seen through the novice's gaze. These are signs of competence as reflected by the novices within the study and have been identified through the consideration of language and emotional prosody. There were two main themes that were evident: communication and nursing practice.

8.2.4.1 Nursing Practice seen via the Novice's Rules

Listening to the utterances and the emotional prosody, ten rules governing nursing practice as determined by the novices have been identified (Figure 46). The novice is rule driven and needs to have clear boundaries as they show respect for the patient and others. The patient is at the centre of their practice and must be spoken to and their consent gained, and it is a relationship shown through communication that is respectful and aware of the power dynamic.

- The patient must be spoken to and given an explanation as to what is happening before it happens to gain their informed consent and agreement
- The patient must not be spoken over, if needing to discuss the patient's condition, the nurse must move away from the patient
- When communicating with other professionals for the purpose of handover the nurse must have all of the information required beforehand
- When offering reassurance, the patient must not be patronised
- The nurse's body language must be open
- The nurse must listen to what the patient is telling them and use appropriate questioning to gather further information without repeating what they say Ensure that the patient's dignity is maintained at all times
- Inform the patient what is happening even if it is not directly involving them at that moment
- The nurse must think about that they are doing so that they can offer a rationale.
- Proficiency with clinical skills such as basic life support is important

  Gather the right information before acting through the use of a systematic approach appropriate for the task such as ABCDE or SBAR *(Airway, Breathing, Circulation, Disability, Exposure. Situation Background, Assessment, Response)*

Figure 46: The novice's rules of nursing practice

The rules of the novice are not explicitly seen in the experts' thick description but are embedded within their precepts that guide their practice (Figure 47). The expert has moved on from requiring explicit rules to a deeper understanding and involvement with the patient and their nursing practice. They recognise that the patient is at the centre and act accordingly, and in a manner that is greater than the individual rules of the novice, acting often without continuous recognition of said rules. As stated by Dreyfus and Dreyfus:

> An expert generally knows what to do based on mature and practiced understanding. When deeply involved in coping with his environment, he does not see problems in some detached way and work at solving them, nor does he worry about the future and devise plans when things are proceeding normally, experts don't solve problems and don't make decisions; they do what they do normally.
>
> Dreyfus and Dreyfus (1986, p.30)

- The patient is able to provide the nurse with the information required both verbally and through a systematic and comprehensive assessment
- The information provided by the patient must form a part of the hypothesis
- Physiological observations should form a part of the whole assessment
- Awareness of boundaries and when to call for assistance is important
- Team work and appropriate allocation of roles is required

Figure 47: Precepts seen in the utterances of the experts

The stimulus remains the same but the interpretation is guided by the expert's ability to recognise patterns holistically through their experience and to apply their knowledge to recognise the salient points. When the viewer takes on the role of mentor or educator, then they apply these rules even though unconsciously, and these are evident in the language that they use to demonstrate their construction of knowledge. Had the novices and experts been asked to articulate the rules of the gaze, or indeed, what they do when they observe a clinical situation or patient, could they verbalise these? My conclusion is no, as there is a degree of the tacit knowledge within each group, the level of which depends on their experience, the context and role within which they find themselves and the language with which they use to articulate this.

8.2.5 Seeing the Novice in the Expert

During the analysis of the data it became evident that participants Ex9 and Ex10 were exhibiting behaviours I had associated with the novice group. Both participants Ex9 and Ex10 were chosen as they were experienced lecturers, both of whom had been involved with simulated practice, requirements for inclusion in the experiment. However, on further consideration of their

biographical detail it emerged that in comparison to the other experts they had less clinical experience. Through the identification of these two outliers in the expert group I revisited the data to ensure that I had not miscoded or wrongly interpreted the data. After careful consideration I determined that these two participants, whilst deemed expert by position, were in fact demonstrating novice behaviours, as identified in their verbal utterances which were more akin to those of the novice group but without showing the same degree of rule driven behaviour. Both participants perceived some elements of the episode as a whole by drawing on maxims, but their application of rules was overt, as heard through their emotional prosody. Positioning these two participants in Benner's application of Dreyfus and Dreyfus' model of skills acquisition would arguably place them as an advanced beginner or competent. They are both displaying awareness of the rules through their reaction to them being broken, whilst showing an awareness of clinical understanding. The supposition of Shanteau (1992), Farrington-Darby, and Wilson (2006) is that the expert may not always be the expert, and as demonstrated here, these participants may be considered experts by position rather than experience.

This finding has implications for the definition of expert and the consideration of experience. Whilst both participants were experienced in nursing practice and simulated practice, what they appeared to lack in comparison to the others within the expert group is active clinical experience, which allows for the development of expertise. This should not be considered a negative, and may in fact be advantageous when teaching novices. The literature suggests that experts find it difficult to explain and justify their decision-making, drawing on holistic pattern recognition and the tacit dimension. Therefore, it must be asked whether they are the appropriate people to teach novices who require explicit rules to support their development. Novices need to know the right and wrong, the fundamental aspects of being a nurse, so that they are able to develop their own rules and then maxims through active experience, guided by those who understand them.

8.2.6 Conclusions on the Methods

This thesis has faced many challenges during its production. The decision to draw on experimental methodology and then approach the data through an ethnographic lens, influenced by the post-structuralist belief that nothing is outside of a text, led to the creation of this work. It is therefore timely to present the final conclusions on the methods by offering a critique, and as such to consider validity.

With each method of data collection and analysis comes limitations, and having an awareness of these allows the researcher to take them into account and plan to address them. Here the methods that have been drawn on were each well established in their own way; however, they

had not necessarily been employed in the same way as in this study. It was clear that the methods would need to be sophisticated enough to allow the tacit to be identified within two forms of data, namely eye movement and verbal utterances. The methodology of applied thematic analysis (Guest et al., 2012) provided the framework for the analysis of the data. This was tried and tested on existing data before being employed in an experiment yielding a larger data set. This approach allowed for the in-depth analysis of eye movement for the identification of themes that could then be searched for in the larger data sets. Watching the videos with the eye movement overlaid, proved to be a time consuming, but valuable approach to the analysis of eye movement. It not only allowed for immersion in the data but also meant that the data could be integrated and considered in depth. By watching the video and listening to the action I was able to see what the viewer was looking at, combining this with listening to what they were saying at the same time, and to make judgements of my own. The notes taken whilst watching the eye movement in this way led to the formation of notations and the creation of text that was then combined with the other data from the individual and brought together as a whole with the others within the same group.

Eye tracking provides an indication of what the viewer is looking at but does not necessarily suggest that they found this to be of interest or were confused by it, it is therefore important in a study such as this where the viewers' understanding and opinion on what they are seeing is key. The decision to use concurrent thinking aloud sought to overcome this limitation, whilst appreciating that the eye is quicker than the utterance and therefore what the viewer is speaking may not be directly related to the eye movement at that time (Duchowksi, 2007; Homqvist et al., 2011). This is a known concern, and by watching the video with eye movement overplayed at the same time as the verbal utterances, ensured that the two could be linked, moving back and forwards, making notes in gaze-to-text. The semi-structured interviews meant that the viewers thinking and judgements could be also gathered, allowing for the important post-hoc analysis. Whilst it could be argued that concurrent thinking aloud slows the viewer's eye movement (Bojko, 2013; Alshammari et al., 2015), it was felt that it was more important to balance the two and listen to the natural and intuitive thinking that concurrent thinking aloud permits. The semi-structured interviews then allowed for confirmation of the viewers' thinking.

The development of themes and the creation of a framework for the analysis using Austin's speech act theory and the emotional prosody of Rigoud and Pell (2012) was novel and had not been previously combined and applied. Neither had either been used in the context of nursing language or the nursing gaze. This therefore demanded attention with careful consideration of how I was developing this framework and applying it. The inclusion of large amounts of 'raw' data and a clear discussion of how I have analysed it and drawn conclusions allows for the reader to

undertake their own. The methods were guided by my own ontological view and therefore have been considered within this context.

8.2.7 Viewer as Constructor of Knowledge

In Chapter 3, the viewer as the negotiator of the text was presented with an idea that emerged from the stance of post-structuralist thinking and which was influenced by the key tenets of ethnography. Whilst I initially believed that this approach would be useful, I was not prepared for how much rich data would be gathered, and how the viewer was not only the negotiator of the text but also the constructor of knowledge (Martinez, 1992). In this regards, as the researcher and hearer of the message, have translated the tacit knowledge embedded in the eye movement and verbal utterances of the viewer, thereby conveying the message that is being sent.

Listening to the participants' utterances led to the identification of emotional engagement with the simulated practice and the creation of rules, further validating the methods. The emotional prosody within the novice group enhanced the performative utterances that had already been identified. The apparent absence of this is in all but two of the experts, led to the conclusion that the experts were not as emotionally engaged and were drawing on maxims and holistic pattern recognition; their rules were evident but not explicit. Identification and exploration of the two outliers in the expert group further validated these findings.

The use of such an approach has enabled the articulation of the tacit element of the nursing gaze through seeing, hearing and handling it. The multiple-voices are heard, and by doing so act to identify the limit through the core of language (Williams, 2014). The concept of the nursing gaze is no longer a theoretical proposition but a text, with a language to explore it, identify it and represent it.

8.3 Validity and Trustworthiness

Before moving onto to discuss the implications of the findings, it is important to demonstrate that this work is trustworthy and is making valid claims; therefore, it is necessary to reflect on the processes and journey that I have undertaken. This work claims a number of conclusions obtained from data collected and analysed during two phases of the study. To ensure these are valid conclusions it is important to demonstrate credibility in the claims within the context of the methodology (O'Reilly and Kiyimba, 2015).

Post-structuralist thinkers have contributed to the understanding that the inner life of an individual is always filtered through lenses of language, gender, social class, ethnicity, race and

knowledge (Denzin and Lincoln, 2005). This thesis does not claim to have 'the' answer and definition of the nursing gaze, rather it appreciates that the gaze is seen through the experiences and understanding of those who hold it. Through the articulation of the nursing gaze in this manner, a deeper understanding of nursing and visual assessment has been reached. Turning the gaze to text and negotiating it to construct knowledge and view it through the filter of experience, offers a perspective of the truth (Williams, 2005).

At each point in the journey I have questioned my own interpretations of the data, discussing and checking with colleagues with similar clinical experience. Whilst their filter is their own, the similarities have provided confidence in the findings and interpretations. Member checking in this way is a useful approach to ensure that the story is methodologically convincing (Malterud, 2001) and was one way in which trustworthiness was ensured. A clear influence at the beginning of this study, which remains throughout, is the work of Benner (1984), Dreyfus, and Dreyfus (1986), and this work and findings build on what they achieved. While Benner and Dreyfus and Dreyfus drew on the ethnographic technologies and methods available at that time, I have done the same, drawing on those available at the time of this study, exploiting the developments in both. The confirmation of their findings drawing on the novel methods employed in this two-phase study supports the validity and trustworthiness of both their findings, as well as my own.

During each phase of the analysis, I drew on supervision to debate my thinking and findings, I also considered the proposal by Kahn (1993) of three ways that a methodologically convincing story can be judged: (1) the investigators relationship with the participants; (2) relationship with the data; and (3) the relationship with the readers.

8.3.1 Relationship with the Participants

In the experiment in phase 2, my relationship with the participants enabled me to recruit them to the study. When recruiting to the expert group a gatekeeper was utilised and letters so that colleagues did not feel obliged to participate. This worked well and from the ten letters sent, all those contacted responded positively. This purposeful recruitment ensured access to those deemed as having the skills and experience to act as this group. Inclusion of this in the participant information sheet may have influenced them; I was saying that I valued both their experience and them. Did this then have an impact on their participation and their data? A discussion with one of those in this group about a month after they had participated said that they had been discussing it with another member of this group. They had both found it an interesting and challenging experience, but had been worried during it that they were not 'giving me what I needed' and that they didn't want to be too negative about what they saw. When I thought about this, I began to

wonder whether my instructions were directing them to be positive rather than honest. Looking back one of these particular participant's data, I saw that they had the least amount of utterances of the experts. Had I been inadvertently influential? This is something that cannot easily be controlled for, but awareness of is important in interpreting the data.

8.3.2 Relationship with the Data

During the analysis phase I became immersed in the data, finding every word and every gaze interesting, and at times it was difficult to step away. At the beginning when using Monger's data, I continually asked myself if I was doing the right thing, was what I was seeing there? Was I doing it justice? Having my supervisors and Monger to discuss my concerns and findings with was useful in helping me to develop confidence in my own interpretation. I found that I was continually looking to my own experiences to make sense of what I was seeing and hearing. Without my clinical experience I would not have been able to make sense of the data, but I was aware that this knowledge and experience could also lead me to seeing and hearing what may not have been there. Maso (2003, p.39) refers to this as 'positioning of self', the purpose of which is to promote the integrity, quality and trustworthiness of the research (Lincoln and Guba, 1985) and in this study my insider knowledge was invaluable.

The use of a journal and the multiple sources of data and subsequent analysis helped me to validate my own findings and conclusions. As the negotiator of a text already negotiated by the viewer, reflexivity was important. The use of semi-structured interviews aided in ensuring that the performative of the verbal utterances was accurate and what the viewer had intended; I was hearing the message.

The data collected by Monger (2014) and analysed in phase one of this study had previously been considered for validity in Monger's own study. However, my analysis of the data in a manner that had not previously been undertaken required attention to ensure that the analysis was trustworthy and conclusions valid. This was achieved through a reflexive approach (Mason, 2003), identifying themes in the verbal data, coding the data, and providing a face value check through counting the instances.

Combining the three data sources, i.e. verbal utterances, eye movement and the semi structured interview data, allowed for the triangulation of the results and a further check that the conclusions were valid (Silverman, 2013; O'Reilly and Kiyimba, 2015). Finally, the conclusions drawn from the verbal data during the initial development and testing of the methods supported the conclusions that Monger had made. Whilst the findings were novel they drew on an established theoretical basis and were not opposed to the conclusions of Benner, Scholes, Dreyfus

and Dreyfus, rather they were further developments. The introduction of performative speech acts and emotional prosody identified through this study add another element to the understanding of how skills acquisition and development. This has implications for the continued development of such theory within nursing and other professions.

8.3.3 Relationship with the Readers

Throughout I was aware that I would be writing this for an audience with varied interests and knowledge, and that I would need to show a clear journey. I hope that I have done this and truly represented the participants' voices by creating a convincing story. The overt use of the participants' voices, both verbal utterances and eye movements, throughout this study ensures that the reader is able to judge for themselves my interpretation.

It has been a challenge in representing the eye movement that has been gathered watching a dynamic video, and much care has been taken to enable the reader to see the movement of the viewers' eyes. Turning the eye movement to text in the development of gaze-to-text has not only addressed this challenge but also offers others a tool to do the same again.

The final element is the contribution that this study will make to the body of evidence and how it is positioned within it. As seen in Chapters 1 and 2, this work has been developed on a theoretical standing firmly secured within the literature, and the developing of the coding is aligned with the Nursing and Midwifery four domains of competence (2010). The conclusions drawn from the data have been considered in conjunction with the literature and have moved what is known forwards towards a greater understanding of the tacit nature of the nursing gaze.

8.3.4 How I have Changed through this Journey

Whilst Kahn (1993) does not explicitly suggest reflecting on how you have developed, it is important to recognise that through this process I have changed, and therefore the relationship I have had with the participants and data, and less so with the reader, influences the validity and trustworthiness of this work. At the beginning of this journey there was so much to explore and learn about, and at the end of this journey there is still so much to explore and learn about, but now from a different position. Emerging myself in the data has meant that I have created and negotiated my own text whilst considering that of others. Developing the conceptual framework of the nursing gaze has encouraged me to consider my own practice and beliefs in what nursing is and nursing does. I have actively developed my own educational practices to support students and novice nurses in the understanding of what I have termed the 'messiness' of nursing, and I hope that the readers will negotiate the text that this thesis provides and challenge their own.

This is not the study as it began; working and co-creating knowledge with all of the participants has led to a greater depth of knowledge and something that I will continue to take with me into the next stage.

8.3.5 Implications of the Findings

In a challenging and demanding culture, such as healthcare, it is important to recognise the emotional involvement and engagement of all, but especially those at the beginning of their journey. The engagement and investment seen from the novice participants demonstrates their passion for the provision of the best possible patient care but their limited experience means that they are not yet comfortable with the messiness of nursing. To support these students in developing their experience and resilience, we must be aware of emotional involvement and the role that this plays.

The use of a video of simulated or real practice may be a useful tool here, acting as a stimulus for a discussion between the novice and the educator. An increasing body of literature supports the use of expert's eye movement in teaching novices, and in this research the eye movement has been shown to be similar between the two groups and therefore this is not of use. This is an area for further consideration and research, as it is probable that the dynamic stimulus alters the usefulness of eye movement as a teaching tool but the knowledge that it has generated adds to the body of knowledge. As has been seen in this work, those of different levels of experience will recognise and interpret the same stimulus in different ways; they will see the same things but based on their knowledge and experience, as well as their own rules, will construct their own knowledge and make their own judgements.

This has clear implications for nurse education both in universities as well as in practice settings, with questions needing to be asked and answered. For example, how do we support students to face the messiness of the practice of nursing? Is this something that we can do or is recognition of this fact enough? It is not the remit of this thesis to answer these questions but to add to the body of knowledge that can be drawn on to explore and provide answers. Dreyfus and Dreyfus (1986) were clear in the development of their skills acquisition model that understanding the individual's current stage allows for the creation of appropriate learning opportunities. The consideration of the emotional prosody in the language of nurses may add to the identification of where they are, rather than relying on the linear stages of skills acquisition that are perceived to come with time or position. This is worthy of further study in the identification of expertise and the context in which it is situated. If we can further understand how novices move in and out of the state, we may be able to expedite it.

8.4 Conclusions

Chapter 1 argued that there was a nursing gaze and that this consisted of a tacit dimension not easily identified or open to exploration. The work of Foucault and the concept of the gaze were then used to develop a working definition of the nursing gaze:

> **Embedded in nursing practice, the nursing gaze is a specific way of seeing, knowing and describing situations that draws on the known and the tacit to determine engagement of the holder with the object of the gaze**

The experiment undertaken supported the identification of these tacit elements, and the identification of the emotional prosody was an important factor in the development of the rules that illuminated the nursing gaze. The novices showed their displeasure, frustration or anger when they perceived that the rules that they held were being broken, allowing for these rules to be incorporated into the understanding of the nursing gaze. Seeing and hearing these rules within some of those deemed to be experts led to a reconsideration of expertise, and consideration needs to be given to further defining this in the future.

Illumination of the nursing gaze adds depth to the understanding of nursing as an art, science and act. The tacit element of the nursing gaze has been elucidated and continues the journey of understanding nursing and how nurses nurse. We are moving into new and ever more challenging times. Technology is developing at fast pace and offering exciting opportunities to truly understand the nursing gaze for the benefit of nursing, nurses and those within their care.

The original purpose of this study was to explore the nurse's visual assessment and reveal what nurses look at and 'see' when they observe a patient or a clinical situation. Revealing the seeing of both novice and expert nurses enabled a theory of the nursing gaze to be proposed, which has deepened the understanding of how seeing is developed. During this journey the significance of Foucault's concept of the gaze became apparent, and drawing on this the initial question was:

> What is the nature of the nurses' gaze? What do they 'see', 'recognise', and describe when they are looking at a scene in their nursing role?

This question evolved through a wider reading of the literature and reflection on my own practice, both clinical and in education, and was refined as:

> Can the cognitive and perceptive elements of the nursing gaze be articulated through the comparison of novice and expert nurse's eye movement and verbal utterances through the watching of a video os simulated practice?

The hypothesis was that turning this gaze and its tacit elements into something that could be seen, handled and explored would enable articulation of the nursing gaze. Through this the body

of scholarship regarding nursing and nursing practice is added to, and this knowledge can then be explored in the future in order to support the development of novice nurses.

There were six aims associated with this study, and whilst there is never an ending for a post-structuralist, achievement of these signalled the completion of the study.

1. Identify methods of data capture which will facilitate identification of the nursing gaze through an analysis of the spoken and unspoken
2. Identify methods of data analysis which will facilitate identification of the nursing gaze
3. Test the identified methods of data capture to facilitate identification of the nursing gaze through an analysis of the spoken and unspoken
4. Test the identified methods of data analysis to facilitate identification of the nursing gaze
5. Assess the validity of the methods of data collection as methods of capturing the nursing gaze through a comparison of the findings from each data set
6. Identify characteristics associated with the nursing gaze of those with differing levels of experience from which conclusions can be drawn

Aims one and two were addressed within this thesis in Chapters 1 and 2, and acted as the foundation for the development of gaze-to-text, which addresses aims three, four and five. The final aim was achieved through the development and undertaking of the experiment.

As a researcher, I had the necessary competencies, both clinical and investigate, to conduct the study by drawing on the technologies available at the time to further what was known. The literature presented and debated provided a theoretical foundation on which to develop a study exploring the concept of the nursing gaze. Reflecting on my own ontological worldview and aligning this to post-structuralism led to the development of the hypothesis that the 'tacit' and invisible within the nursing gaze could be turned to text and negotiated. The development of a conceptual framework of the nursing gaze supported the subsequent development of novel methods of analysis, which were tested using data from a study by Monger (2016). This led to the design and undertaking on a one armed experiment that asked groups of expert and novice nurses to watch a video of simulated nursing practice and to think aloud whilst doing so. This led to the development of performative utterances, which drew on Austin's (1962) work to incorporate the ways in which expert and novice nurses use language, and in particular, how consideration of the emotional prosody provides valuable insight into the gaze. The rules of the gaze discovered when both phases one and two were brought together offers a further insight into the nursing gaze and how it differs between novice and expert nurse.

8.5 Novel Contributions made by this Thesis

This thesis adds to the body of evidence regarding the nursing gaze, the development of skills in nursing, and the development of methods to explore such phenomena. Using established techniques of eye tracking and verbal protocols to gather data from novice and expert nurses, the data were analysed in novel ways. From this research it is possible to claim five substantive contributions to the body of evidence: (1) the creation of a novel method for turning the nursing gaze to text; (2) the development of an approach to analyse performative utterances that could be used in the context of nursing; (3) the development of a new way of uncovering emotional prosody in novice nurses; (4) evidence of the emotional struggle novice nurses go through when they perceive the rules being broken; and (5) the creation of a conceptual framework that describes key elements of the nursing gaze.

8.5.1 Novel Method for Turning the Nursing Gaze into Text

Drawing on Derrida's (1976, p.35) post-structuralist view that 'nothing is ever outside a text since nothing is ever outside language, and hence incapable of being represented in a text', the nursing gaze is turned to a text through the development of 'gaze-to-text', which is a novel method. This thesis has demonstrated that a key component of the nursing gaze is tacit, something which is difficult to verbalise, and by turning this into text in the form of eye movement and considering the signalling and emotional prosody of the viewer, the tacit can be seen, handled and explored. A fundamental aspect of this is the consideration of the viewer as the negotiator of the text with the researcher as a bricoleur, drawing on shards and fragments to address the problem (Gobbi, 2005), and in this study by drawing on ethnographic techniques in novel ways to uncover the tacit.

8.5.2 Development of an Approach to Analyse Performative Utterances that can be used in the Context of Nursing

The study of language offers the opportunity to explore the speaker's meaning. Drawing on Austin's speech act theory, performative utterances that could be used in the context of nursing were developed. Nursing is dynamic and multifaceted; therefore, the language that they use conveys much more than is said. The performative utterances presented in phases one and two offer a framework for analysing the language of nurses with reference to the context in which they are delivered.

8.5.3 Development of a New Approach for Uncovering Emotional Prosody in Novices

One aspect of the performative utterance is the emotional prosody, seen clearly in the novices in this study. The words that are spoken are only one part of the story, and the emotional prosody has a performative function of its own. Chapter 3 introduced this concept, drawing on Austin's theory of performative utterances and this was drawn on in Chapter 8 to establish the rules of the novice's nursing gaze. Development of our understanding of the emotional prosody in making judgements as a part of discourse will further support our understanding of both the nursing gaze and the development of resilience in novices.

8.5.4 Evidence of the Emotional Struggle Novice Nurses go through when they Perceive that the Rules are Being Broken

In the analysis of the data in Chapter 7, it became apparent that novices have an emotional struggle when they perceive that the rules of the gaze are broken. Through the analysis of the language and the emotional prosody, it was possible to see and hear this struggle. An opportunity then arises for this to be considered and shared with other novices in order to validate and support their feelings whilst identifying the messiness that is nursing, and how they may develop resilience through understanding.

8.5.5 Created a Conceptual Framework that Describes Key Elements of the Nursing Gaze

In order to develop our understanding of the nursing gaze I have created a conceptual framework that illuminates the influences on the gaze and provided a means of exploring its cognitive and perceptive elements. Drawn from a synthesis of the literature and the studies undertaken within this thesis, this conceptual framework is novel and it represents a detailed diagrammatic representation presented in chapter three, that may be used to further explore the nursing gaze. The creation of this conceptual framework permits further research exploring the nursing gaze, offering the researcher variables that could be considered and manipulated in an experimental manner and offers a framework for analysis.

8.6 Limitations of the Study

In order to consider trustworthiness it must be recognised that this two-phase study drew on ethnographic techniques from a post-structuralist standing, turning eye tracking and verbal utterances to text. At the time of writing this thesis no one has yet developed a conceptual framework of the nursing gaze drawing on eye tracking and verbal utterances; however, the novelty of this approach should not diminish it. Rather, through the extensive inclusion of both

verbal utterances and eye movement from the participants this offers others an opportunity to negotiate the text and create their own.

Limited by the technology available to me at the time of the study, means that the sophisticated quantitative data which is now available with the development of eye tracking software could not be collected. Although there may be opportunities for the data from this study to be re-considered by drawing on such technologies. However this limitation turned out to be useful, and creative thinking led to the development of Gaze-to-text a novel and important development

As a registered nurse, an educationalist and an interested party, I have driven the interpretations that have been made throughout this study, but they are my own. I have chosen the segments from the video and the illustrations of text and eye movement to present, and these have been guided by my own experiences and beliefs. Another person may have chosen differently and their voice and their gaze on the negotiated text can but only add to the further development and understanding of the nursing gaze.

8.7 Recommendations for the Future

The methods employed here demonstrate that those traditionally associated with one domain can successfully be used in another. This supports the researcher as bricoleur (drawing on what is required to achieve the aim), a concept applied by Gobbi (2005) to nursing practice, and one which may be drawn on within the 'fractured future' of Denzin and Lincoln (2005) to explore the new spaces which welcomes 'messy' and multi-voiced texts. With the recognition of the complexities and messiness of nursing comes the recognition that the methods, which will allow for exploration, may also be complex and messy. However, a challenge remains in maintaining the truthfulness of the research in such a culture.

Further exploration of the nursing gaze with regards to the emotional prosody is certainly required. With the ever-changing landscape in which nurse's work and the continuing challenges, understanding the psychological contracts, the rules and how nurses react when they perceive them to be broken, requires greater attention. This will then aid in the development of resilience within a profession that is messy, often poorly defined, and is of high stakes for all involved.

The developments in technology and the continuing challenging and demanding times offer further opportunities to address the initial research question, building on this study and others. The nursing gaze has been explored using a video of simulated nursing practice, and the next step would be to take the principles and apply them in a clinical setting. This would enable the conclusions from this work to be tried and tested in the complex, often 'messy' and complicated,

real world of nursing, rather than in the controlled manner of an experiment. With developments in technology it is possible to enter such settings in an unobtrusive manner, although ethical challenges remain. As can be seen in the literature review, no-one has yet reported that they have taken eye tracking into the clinical area, and this may be due to the ethical considerations required when videoing patients and practitioners, something I came across early in this journey. However, with the increase in reality television shows with camera crews seemingly having unrestricted access to patients in acute settings, including emergency rooms and intensive care units, this may be changing.

There remains the challenge of analysis for a dynamic stimulus such as video. In the literature there are a number of methods for the analysis of eye movement when the stimulus is static, or is at least static within a frame. However video offers its own challenges, many of which have been presented and overcome in this thesis. These were time consuming, and whilst the application of an Applied Thematic Analysis framework resolved this, it remains an area for future consideration. Further exploration of the nursing gaze with regards to the emotional prosody is required to understand its important in the development and acquisition of skill.

During the course of this study parallel work undertaken by the Semantic Nurse, within the Smart Society project, has started to explore the importance of understanding the authority and interplay of technologies (Bahle et al., 2014; Patel et al., 2017). With the almost expediential development of technologies and theories of artificial intelligence and machine learning, it is becoming increasingly important to understand how technologies can be employed as both research tools and as tools within healthcare. Telemedicine, where the expert is remotely brought to the bedside, is increasingly being employed, overcoming the challenges of time and space (Latifi, 2011; Oudshoorn, 2011; Theurer et al., 2017: Thomas et al., 2017). However, questions remain as to how the use of technology to 'see' the patient and interact with their care remains unanswered. Does the removal or alteration of the stimulus and limitations in the ability to interact and manipulate the 'object' of the gaze alter visual assessments? Does the inclusion of a screen and removal from the patient's presence alter the emotional engagement? There are many such questions, and with each step in uncovering new knowledge, new questions emerge. As the ability to hear and see multiple voices emerges, the need to listen to these becomes increasing important, and the methods developed within this study offer opportunities to continue to ask and answer such questions.

8.8 Final Conclusions

The nursing gaze is a complex and important phenomenon, and this thesis has added to the body of work that seeks to explore the tacit nature of the nursing gaze, supporting the scholarship of nursing practice. With so much unsaid and unsayable, invisible to the eye but present, exploration of the nursing gaze cannot finish here. Drawing on what is known and looking to new and novel ways, the nursing gaze can further be understood through turning it into something that can be seen, handled and explored. Only then can we secure our place, safe in the understanding that whilst we may never fully expose the tacit nature of the gaze, we can work towards developing it in those we support in their learning. As Florence Nightingale stated:

> The most important practical lesson that can be given to nurses is to teach them what to observe-how to observe-what symptoms indicate improvement-what the reverse-which are of importance-which are of none-which are the evidence of neglect-and of what kind of neglect.
>
> Nightingale (1860; 2017, p.58)

Appendix A - Critiqued Studies

Dynamic stimulus with associated task (Viewing, detection, decision, problem-solving, diagnosis, prediction of outcome, description)			
Domain and focus	**Method, design and task**	**Data analysis**	**Results and conclusions**
Balsev T. Jarodzka H. Holmqvist K. de Grave W. Muijitjens A. Eika B. van Merrienboer J. Scherpbier A. (2012) Visual expertise in paediatric neurology *European Journal of Paediatric Neurology 16* 161-166			
Paediatric neurology – accurate diagnosis of seizures	Diagnosis of possible condition All watched all videos with concurrent think aloud 4 videos with AOI's determined by experts **Population/ sample** 15 medical students 16 residents 12 experts	<u>Dependent</u> Diagnostic accuracy Time on task Time looking at AOI <u>Independent</u> Level of expertise **Analysis** Verbal data coded at 3 levels; Data exploration Theory building Theory evaluation	More experienced explored less data, built more theory and evaluated more theories. More experienced clinician's process visual data more effectively. Concomitant perceptive and cognitive data reveals how more experienced clinicians compare to less experienced clinicians.
Betram R. Helle L. Kaakinen J. Svedstrom E. (2013) The effect of expertise on eye movement behaviour in medical image perception *PLOS ONE* 8(6) 1-15			
Medical image	Diagnosis of possible condition 1 practice and 9 volumes of multi-stack CT's **Population/ sample** 22 students (no experience) 9 CT radiographers (intermediate) 7 radiologists (experts)	<u>Dependent</u> Diagnostic accuracy Fixations <u>Independent</u> Level of expertise	Experts outperformed others, detected more abnormalities, increased fixations on relevant areas and had shorter saccades. Experts needed fewer fixations on relevant areas than intermediate group

Appendix A

Crespi S. Robino C. Silva O. de'Speratti (2012) Spotting expertise in the eye: Billiards knowledge as revealed by gaze shifts in a dynamic visual prediction *Journal of Vision* 12(11): 30 1-19			
Billiards – predict final outcome and trajectory of ball	Prediction of outcome 48 videos (24 repeated for each) 5 within-subjects and 1 between subject ET and verbal response to question **Population/ sample** 42 (1 woman) 21 experts (varying) 21 novices	<u>Dependent</u> Accuracy of answer yes/no Response time Trajectory extrapolation Fixations Time on ROI <u>Independent</u> Shot difficulty Shot accuracy Expertise level **Analysis** Students t test and repeated- measures ANOVA Dynamic heat fixation maps Statistical comparison to locate regions of interest	Experts performed better in terms of accuracy and response time. Similar saccades (could be explained by the nature of the task) Novices tended to distribute gaze over a wider area than experts. Novices seemed to extrapolate the trajectory of the ball beyond the occlusion point. Reduced exploratory behaviour of experts. *Unbalanced male/female* *Viewers watched whole shot as practice prior to them watching again and making predictions as to what would happen*
Francisco Javier M. Francisco A. Raul R. Vicente L. (2006) Visual behaviour of tennis coaches in a court and video-based conditions *International Journal of Sport Science* 2(5) 29-41			
Tennis coaches	Detection: performance error detection process 5 experienced coaches 5 novice coaches 2 dimensional (in lab) 3 dimensional (court, live) 2 dimensional (in lab)	<u>Dependent</u> Number of visual fixations Time of visual fixations - by ROI <u>Within group IV</u> Dimensions Experience **Analysis** ANOVA between situations Two-pair analysis of variance	Experts had less visual fixations Both groups spent most time on upper body, novices longer than experts Number of visual fixations reduced for both groups as they went through Both groups showed longer fixations in video rather than live

Goulet C. Bard C. Fleury M. (1989) Expertise differences in preparing to return a tennis serve: A visual processing approach *Journal of Sport and Exercise Psychology 11* 1382-398			
Tennis, serve of ball	Detection 14 novice 15 experts Serve divided into phases for analysis	<u>Dependent</u> Correct answer Number of fixations on specific cue <u>Independent</u> Expertise Server's dominant hand (r or l) Type of serve **Analysis** Split-plot factorial design Significant effects identified through Tukey posteriori procedure ANOVA	Experts had higher number of correct responses (expertise x situation ANOVA) Significant interaction expertise x situation found (initial and final phases most important) Novices need to see the ritual phase to be accurate (unlike experts) they cannot code the valuable information present in first phases of serve; Decision time faster for experts Experts superiority in perceptual anticipation Experts use information differently and need less information and make quicker decisions
Jarodzka H. Scheiter K. Gerjects P. van Gog T. (2010) In the eyes of the beholder: How experts and novices interpret dynamic stimuli *Learning and Instruction* 146- 154			
Fish locomotion.	Description of locomotion Experiment 2 arms 4 videos Cued RTA **Population/ sample** 7 expert 14 novices	<u>Dependent</u> Correctness of technical term Mean viewing time Distribution of gazes across AOI's <u>Independent</u> Level of expertise **Analysis** <u>ET data</u> ANOVA and MANOVA 2 x 3(performance) <u>CRTA</u> Initial utterance (subdivided) Relevance of features mentioned Overall no. of words used	Experts; Were faster, More accurate, Consider more of relevant information earlier, Attention remained focused on relevant areas, Attend more relevant features Novices need factual knowledge to express observations correctly. Novices may benefit from instruction that contains instructional guidance. Experts do not have difficulty in verbalizing their reasoning. Expert may have own ideas of what is relevant. Therefore, experts should model as is taught. *Small number of participants.* *As fish move, relevant parts not always visible.*

Appendix A

Khan R. Tien G. Atkins S. Zheng B. Paton O. Meneghetti A. (2012) Analysis of eye gaze: Do novice surgeons look at the same location as expert surgeons during a laparoscopic operation? Surgical Endoscopy 26 3536-3540			
Laparoscopic surgery – Video viewing	2 phase study - Identification of viewing points in live and replayed surgery 4 experts (only 2 eye able to be eye tracked) ?no. Novices 16 cases of surgery	Compared overlay of self-watching and watching others. **Analysis** ANOVA self-watch vs. other watch	Novices had eye gaze patterns that wandered from key areas, experts demonstrated closer eye-gaze patterns that focused on key target areas Expert gaze can be used to make teaching videos for novices
Raab M. Johnson J. (2007) Expertise-Based Differences in Search and Option-Generation Strategies *Journal of Experimental Psychology: Applied* 13(3) 158-170			
Hand ball players	Decision making - tactical Longitudinal design 3 groups experts 29 near experts 22 non experts 18 15 video clips After each clip, verbalised first option	Perceptual memory recall test prior to videos After each clip, verbalised first option <u>Dependent</u> Quality of initial option Quality of final option Number of generated options decision time generation time dynamic inconsistency Number of fixations and duration of fixations for each region Decision quality assessed <u>Independent</u> Level of experience **Analysis** MANOVA for cross sectional comparison	Experts require fewer fixations (partial evidence) Gaze strategy had no effect on number of options generated but a spatial gaze strategy led to better initial generations and final choices
Shimizu S. Kadogawa T. Kikuchi S. Hashizume T. (2014) Quantative Analysis of Tennis Experts' Eye Movement Skill *Presented at ACMC2014 Yokohama, Japan March 14-16 2014*			
Tennis	Prediction of outcome – predict the placement of the shot 16 expert 16 beginner 2 movies, 1 left handed 1 right. 40 shots in each movie	**Analysis** Heat maps using gaze plots Single parametric model having a polar coordinate system	Beginner has a tendency to follow the ball unconsciously for a moment after ball was hit The more experienced the player the less they followed the ball after the shot

Appendix B - Permission to Use Data

Tuesday, 18 August 2015 10:57:43 British Summer Time

Subject: RE: Permission to access and use data
Date: Monday, 13 July 2015 13:21:35 British Summer Time
From: Monger E.J.
To: Faulds S.J.

Dear Sue
I am very happy for you to make use of the data I collected.
Best wishes
Ellie

From: Faulds S.J.
Sent: 13 July 2015 11:49
To: Monger E.J.
Subject: Permission to access and use data

Dear Ellie,

I am writing to ask for your permission to use the data that you gathered for you thesis "Video-View-Point - Video analysis to reveal tacit indicators of student nurse competence'. This would be for use in my own study as we have previously discussed. If you would like any more information please do not hesitate to contact me.

Best wishes,

Sue Faulds

Lecturer

Directorate of Advanced Clinical and Expert Practice

Faculty of Health Sciences

University of Southampton

Southampton:

Phone: 023 8059 7952

E mail: sjf2@soton.ac.uk

Building 45 room 2016

Student office: 023 8059 7840

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Appendix C - Simulated Practice Script

Mrs Alice Cramp is a 72-year-old lady. She is normally fit and well, but fell over 3 days previously and fractured her left neck of femur. She was admitted to an orthopaedic ward from the emergency department for hip replacement surgery. She was kept nil by mouth awaiting a theatre slot. That night, the decision was taken to delay surgery until the following day and she was allowed sips of water until 0600. The same pattern occurred for the next 2 days because other emergency cases needed prioritisation. Mrs Cramp finally had her hip replacement this morning and has been returned to the ward post operatively with a urinary catheter and wound drain in situ. She has an intravenous catheter in her right arm with a 500ml bag of 0.9% sodium chloride attached but it is not running.

The students are introduced to Mrs Cramp 3 hours after her return to the ward.

The students should introduce themselves to Mrs. Cramp and undertake a physical assessment and document a full set of observations. Mrs Cramp is chatty and 'really wants a cup of tea'. She is repeatedly saying she wants a drink. The students should recognise thirst as an important observation and ask the mentor is she is able to drink. They should also look back at the paperwork to assess her fluid balance status. They should find that the paperwork from theatre is missing and should request it is brought to the ward. The students should also check the urinary catheter that is nearly empty and recognise that the IV fluids are not running.

As part of the assessment they should undertake an ABCDE structured approach and recognise possible dehydration as an issue here and from the history.

They should refer to the medical team for a plan for on-going management of her fluid balance. At this point, Mrs Cramp begins to complain of chest pain and feeling faint.

The students should recognise the limitations of their experience and practice and refer to the medical staff. This depends on the recognition of the cues i.e. change in how she is feeling and signs of dehydration.

They should repeat a set of observations and recognise that her pulse has increased from 78 regular to 123 irregular with an associated drop in blood pressure. They should recognise acute deterioration and be concerned about dehydration as a potential cause and may establish monitoring. They may recognise that the electrocardiogram is now fast Atrial Fibrillation.

This depends on the recognition of the cues i.e. change in how she is feeling and signs of dehydration which now include an altered heart rate and rhythm.

They should refer to the medical team once again, with a clear description of the problem and action that they require, using the recognised referral framework they have been taught (SBAR) Situation Background Assessment Recommendation.

This depends on the recognition of the cues i.e. change in how she is feeling and signs of dehydration which now include an altered heart rate and rhythm.

The students at this point should be reassuring Mrs Cramp, recognizing that she is becoming increasingly uncommunicative and prepare for an emergency procedure, bringing over the

emergency trolley and consider closing the curtains. They should consider administering oxygen and may do and should establish monitoring if not already done.

They students should recognise that this is an urgent medical situation and should be preparing the patient and the environment to ensure safety.

The doctor arrives (after referral made) and decides to perform a synchronized DC cardioversion. The students should recognise their limitations and question this if they have not had experience of supporting this procedure.

This is an appropriate intervention and the students should be aware of what this entails and if not, raise this as an issue and ask for support.

The doctor will direct them to draw up an ampoule of Midazolam (sedation). They should refuse and provide the doctor with the equipment to do this him/herself. The doctor will not correct them if they draw up the drug but will ask them to administer it. They should refuse but again not be corrected if they do.

Students should recognise their boundaries at each stage and therefore refuse to do this with a rationale.

They should assist the doctor with the procedure, follow instructions and observe the patient and the patient monitor throughout.

During this the students should recognise their own safety and act accordingly. They should support the doctor and remain in a position suitable to maintain their observation.

They should request an on-going plan before the doctor leaves the ward. They should repeat the observations and reassure Mrs Cramp, ensuring her dignity is maintained. With more than one student at least 1 should stay with the patient and continue observing them. This then should allow for another to ask for a plan of continued care. If the patient is not yet awake and recovered from the sedation they should ask the doctor not to leave.

Mrs Cramp will start to have a partial airway obstruction (snoring) and they should recognise this, remove the head of the bed and secure her airway with a head tilt/chin lift. They should call for emergency assistance.

The students should recognise this immediately and move the head of the bed away from the immediate area, safely securing it whilst another performs the appropriate movement.

Scenario ends.

Appendix D - Semi-Structured Interview Questions

The following questions identify the main themes for discussion, additional questions will be used in each section to confirm understanding and clarify meaning.

1. How did you find the video?
2. How did you find the experience of using technology like this?
3. [Show still of the students in the video]
4. Can you tell me your overall assessment of the student's competence?
5. Did any of the students stand out, either as competent or not competent?
6. Were there are particular incidents that made you think about their performance?
7. How did you find talking through what you were seeing?
8. Did you find that the technology was easy to use?
9. Can you think of ways that it could be improved?

Second video (Participants E, F, G, H only)

Same as above, plus

How did the 2 systems compare, now that you have used them both?

Appendix E - Transcription and Coding of Verbal Utterances from Phase One

Time	No.	Transcription (and signifiers)	Exploration In bold = need to see video to make sense of	Codes
0110	1	So I think that the one that is speaking now is taking the lead	*Making judgement about the role of one of the students, suggesting that she is taking the lead but* ***what is it that suggests that? Has she spoken first or is it the content?***	Leadership + Communication +
0150	2	So 2 of the 4 of them haven't um umm started doing anything yet.	*Commenting on absence of action by 2 but what are the other 2 doing?* *Suggestion that they should be doing something.*	Absence of action -
0150	3	I haven't seen them look at the notes or look at, not looking at the patient	*Implying that they need to look at the notes and the patient* *Is viewer talking about all of them or the 2 that are commenting on above?*	Absence of action - Patient assessment -
0310	4	The 1 girl seems to be taking the lead and the 2 of them still aren't really doing anything.	*Making judgements about the roles and actions of the students Identifying leadership behaviour in 1 student but what is suggesting this?*	Leadership + Absence of action -
0310	5	1 has got her hands in her pockets	*Negative comment* *Identifying unprofessional behaviour* *Suggestion that they are standing and not engaging with the situation*	Absence of action - Behaviour -
0335	6	I like the way that they've attempted to maintain her dignity by obviously drawing the curtains.	*Positive comment, suggestion that they are trying to maintain dignity. More than one student involved.* ***Did the students offer any suggestion that that is what they were doing? What lead up to or followed this?***	Behaviour + Teamwork +
0330	7	That should be a natural response	***What should be?*** *No context.*	?
0410	8	So at this point 3 of the students are getting involved	*What does 'getting involved' mean? What are they doing? Where is the other 1? Positive comment.*	Interaction + Teamwork +
0410	9	The one with the glasses on doesn't seem very sure of herself	*Making a judgement about confidence* ***but what is it that makes the viewer think this?***	Confidence -
0425	10	Good practice she continues to talk to the patient which they are doing and reassuring her	*Positive comments about behaviour* *Who is the viewer referring to?* *How does the viewer know that they are reassuring her?* *Suggestion that there is more than one of them involved here*	Communication with patient +

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0525	11	I think that the girl that's stood by the screen umm she seems to feel, I don't think she feels that at ease with the simulation	*Making a judgement about 1 student,* ***what behaviour is the student exhibiting to draw attention to this?*** *Using the screen to position the student. Referring to the fact that it is a simulation and student may not feel comfortable with it.*	Positioning - Simulation -
0525	12	If I was her mentor I would probably get her involved in umm taking a bay obviously with talking through what she would do with patient.If they were her patients may be start with thinking about it on her own getting here to think about what others are doing and the moment she seems to be happy that they are doing the work.	*Putting self into situation. Making suggestion that the students need support and guidance and therefore that they are not doing what the viewer expects them to be. Suggestion that 1 of the students is not properly participating and contributing to the situation. Implying it is a confidence issue?* ***What makes viewer think that this is the case?***	Self - Power - Behaviour -
0525	13	She needs more work intensively just because she's ???	*Who does?*	Self -
0630	14	If I was her mentor I would start to show her a thorough assessment to kind of let her see how and why things happen	*Putting self into situation. Making suggestion that the students need support and guidance and therefore that actions are not enough to satisfy situation*	Self - Clinical skill - Power -
0710	15	There's continuous communication with the patient and they have identified that a Doctor is needed, so it's just down to one of them to decide now, who's going to get	*Continuous communication with patient is a good thing and this is identified. Seems to be that there is some discussion about how to action an appropriate response. But they have recognised that the patient is*	Communication with patient + Identification of cues +
		the doctor	*demonstrating cues that she needs additional support that they cannot provide her. Recognition of the limitation of their knowledge and skills.*	Management of cues + Teamwork + Boundaries +
0740	16	Nobody responded to her request for a cup of tea	*Critical comment. Suggests that the students are ignoring the cues from the patient.*	Interaction with the patient - Identification of cues -
0810	17	I'm assuming that the chap has gone off to go and get the Doctor	*Assumption about action of 1 student. Suggests that this is in response to previous comments (comment 15). 1 student has left the screen*	Teamwork + Communication +
0850	18	He's saying all the right things, he gave a bit of history of the patient, so the Doctor know why they are in hospital	*Identifying that the student is saying right things to the doctor (student is off screen)* ***so what is the viewer looking at?*** *What are they?*	Identification of cues+ Knowledge +

0916	19	They are a few minutes into the simulation now and nobody has checked the wound, so presumably with the history of why she came into hospital, they should have known there was a wound which they should have looked at when they did her initial assessment	*Critical about lack of an action in relation to something the viewer feels is important.* *Identifying that the students have missed something important here and that they should not have* *Suggesting that there was an initial assessment (was there)?*	Knowledge - Identification of cues -
0950	20	That girl still isn't doing much	*Which one?* *What leads the viewer to making this judgement? Implying this behaviour has been on-going.*	Behaviour -
1025	21	???		
1032	22	So these 2 that are left should be doing the ECG now	*Highlighting inaction of students and saying what should be happening.* *Viewer has identified cues but students either haven't or do not know how to respond*	Absence of action - Knowledge -
		the doctor	*demonstrating cues that she needs additional support that they cannot provide her. Recognition of the limitation of their knowledge and skills.*	Management of cues + Teamwork + Boundaries +
0740	16	Nobody responded to her request for a cup of tea	*Critical comment.* *Suggests that the students are ignoring the cues from the patient.*	Interaction with the patient - Identification of cues -
0810	17	I'm assuming that the chap has gone off to go and get the Doctor	*Assumption about action of 1 student.* *Suggests that this is in response to previous comments (comment 15). 1 student has left the screen*	Teamwork + Communication +
0850	18	He's saying all the right things, he gave a bit of history of the patient, so the Doctor know why they are in hospital	*Identifying that the student is saying right things to the doctor (student is off screen)* ***so what is the viewer looking at?*** *What are they?*	Identification of cues+ Knowledge +
0916	19	They are a few minutes into the simulation now and nobody has checked the wound, so presumably with the history of why she came into hospital, they should have known there was a wound which they should have looked at when they did her initial assessment	*Critical about lack of an action in relation to something the viewer feels is important.* *Identifying that the students have missed something important here and that they should not have* *Suggesting that there was an initial assessment (was there)?*	Knowledge - Identification of cues -
0950	20	That girl still isn't doing much	*Which one?* *What leads the viewer to making this judgement? Implying this behaviour has been on-going.*	Behaviour -
1025	21	???		

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1032	22	So these 2 that are left should be doing the ECG now	*Highlighting inaction of students and saying what should be happening. Viewer has identified cues but students either haven't or do not know how to respond*	Absence of action - Knowledge -
		the doctor	*demonstrating cues that she needs additional support that they cannot provide her. Recognition of the limitation of their knowledge and skills.*	Management of cues + Teamwork + Boundaries +
0740	16	Nobody responded to her request for a cup of tea	*Critical comment.* *Suggests that the students are ignoring the cues from the patient.*	Interaction with the patient - Identification of cues -
0810	17	I'm assuming that the chap has gone off to go and get the Doctor	*Assumption about action of 1 student. Suggests that this is in response to previous comments (comment 15). 1 student has left the screen*	Teamwork + Communication +
0850	18	He's saying all the right things, he gave a bit of history of the patient, so the Doctor know why they are in hospital	*Identifying that the student is saying right things to the doctor (student is off screen)* ***so what is the viewer looking at?*** *What are they?*	Identification of cues+ Knowledge +
0916	19	They are a few minutes into the simulation now and nobody has checked the wound, so presumably with the history of why she came into hospital, they should have known there was a wound which they should have looked at when they did her initial assessment	*Critical about lack of an action in relation to something the viewer feels is important.* *Identifying that the students have missed something important here and that they should not have* *Suggesting that there was an initial assessment (was there)?*	Knowledge - Identification of cues -
0950	20	That girl still isn't doing much	*Which one?* *What leads the viewer to making this judgement? Implying this behaviour has been on-going.*	Behaviour -
1025	21	???		
1032	22	So these 2 that are left should be doing the ECG now	*Highlighting inaction of students and saying what should be happening. Viewer has identified cues but students either haven't or do not know how to respond*	Absence of action - Knowledge -

Appendix F - Participation Information Sheet for Expert Group

An exploration of the visual observation skills of expert and novice nurses when presented with patient video cases. Version 3

Researcher: Sue Faulds **Ethics number**: 14578

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

I am a lecturer within the Faculty of Health Sciences currently undertaking a study as part of my PhD studies. I am looking at whether the eye movements of nurses differ dependent upon their skill level and if they do, can the eye movements of experts be used to support the learning of more novice nurses.

This phase is aimed at addressing the first part of this study, determining whether there are differences in the eye movement of those with differing skills levels.

Why have I been chosen?

This part of the study is exploring whether there are differences in the eye movement of nurses with differing levels of skills and expertise. You have been identified as a possible participant for the expert group.

What will happen to me if I take part?

If you agree to take part you will be asked to read this information and sign a consent form. We will then arrange a mutually convenient time and date to meet to carry out your part in the study. This will be on the main Highfield campus.

I will then show you the eye tracking equipment, which is a small box below the computer screen, and calibrate it. This involves you watching a dot on the computer screen. It is unusual but possible that you may not be suitable for eye tracking at that time. If after 3 attempts at calibration it cannot track you, we will discuss this and if you wish, rearrange a time to try againIf the calibration is successful, you will then be asked to watch a video of a patient and answer some follow up questions about what you saw and what you thought.

At the same time I will be audio recording your comments whilst you are watching the videos. This will allow for your comments to be transcribed.

The videos contain images such as those you may expect to find in documentary style programmes such as ‘24 hours in A&E’ and ‘An hour to save your life’. If you find these uncomfortable to watch, you may wish to reconsider your participation in this study.

Do I have to take part?

No, there is no requirement and if you chose not to participate this will in no way affect your programme. Please be aware that I am not looking to test your knowledge, this study is about identifying characteristics of those with different skill levels.

How long will it take?

From beginning to end, about an hour.

Will I be paid?

No, there is no payment involved. You will be entered in a draw to win 1 of 3 £10 Amazon gift vouchers.

Are there any benefits in my taking part?

You may find it a useful experience in reviewing your patient assessment skills.

Are there any risks involved?

There is a small risk to those who have photo sensitive epilepsy and therefore anyone with this condition is asked not to participate.

Eye tracking may be affected if you are taking certain medications or have certain conditions so I would ask you to self-exclude if any of the following are applicable to you;

1. You are currently taking any neuroactive medications
2. You are pregnant
3. You have cirrhosis of the liver
4. You have photo sensitive epilepsy (there is a possible risk to you)
5. You have schizophrenia

I have contact lenses/glasses, can I still take part?

Yes. There should be no problem with anyone who wears glasses or contact lenses. As long as you have sight in both eyes and are happy to wear your glasses or contact lenses as you would normally when watching a computer screen.

Will my participation be confidential?

Data will be kept confidential and be managed under the Data Protection Act. It will be kept on password-protected computers on a secure network. Wherever possible your identifiable information will be removed but this is not possible in regards to the audio recordings. The audio recording will be used for transcribing your comments only and will be heard by the researcher and supervisors.

What happens if I change my mind?

If you wish to change your mind please contact the researcher Sue Faulds. Your data will then be removed from the study without penalty to you.

What happens if something goes wrong?

If you have a concern or a complaint about this study you should contact the Research Governance Office (Address: University of Southampton, Building 37, Highfield, Southampton, SO17 1BJ ; Tel: +44 (0)23 8059 5058; Email: rgoinfo@soton.ac.uk .

If you remain unhappy and wish to complain formally the Research Governance Office can provide you with details of the University of Southampton Complaints Procedure.

Where can I get more information?

Please contact Sue Faulds on either sjf2@soton.ac.uk or by phone on 02308597952. A copy of the full protocol can be made available to you and any questions you may have be answered.

I am happy to be involved, what do I do now?

Please complete the enclosed form and leave it for me in a sealed envelope in the internal post or e-mail me on sjf2@soton.ac.uk. As soon as I have received this I will be in contact with you. Thank you for reading this.

Appendix G - Participant Information Sheet for Novice Group

An exploration of the visual observation skills of expert and novice nurses when presented with patient video cases.

Researcher: Sue Faulds Ethics number:14578

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

I am a lecturer within the Faculty of Health Sciences currently undertaking a study as part of my PhD studies. I am looking at whether the eye movements of nurses differ dependent upon their skill level and if they do, can the eye movements of experts be used to support the learning of more novice nurses.

This phase is aimed at addressing the first part of this study, determining whether there are differences in the eye movement of those with differing skills levels.

Why have I been chosen?

This part of the study is exploring whether there are differences in the eye movement of nurses with differing levels of skills and expertise. You have been identified as a possible participant as you are registered on the BN(Hons) programme adult field and are currently in year 1.

What will happen to me if I take part?

If you agree to take part you will be asked to read this information and sign a consent form. We will then arrange a mutually convenient time and date to meet to carry out your part in the study. This will be on the main Highfield campus.

I will then show you the eye tracking equipment, which is a small box below the computer screen, and calibrate it. This involves you watching a dot on the computer screen. It is unusual but possible that you may not be suitable for eye tracking at that time. If after 3 attempts at calibration it cannot track you, we will discuss this and if you wish, rearrange a time to try again.

If the calibration is successful, you will then be asked to watch a video of a patient and answer some follow up questions about what you saw and what you thought.

At the same time I will be audio recording you to allow for transcription.

Do I have to take part?

No, there is no requirement and if you chose not to participate this will in no way affect your programme. Please be aware that I am not looking to test your knowledge, this study is an exploration of the characteristics of those with different levels of skill.

How long will it take?

From beginning to end, about an hour.

Will I be paid?

No, there is no payment involved and this does not form a part of your programme. You will be entered into a draw to win one of 3 £10 Amazon vouchers.

Are there any benefits in my taking part?

The act of observing and discussing the patient may support you in making decisions as to what you see may enhance your learning.

Are there any risks involved?

There is a small risk to those who have photo sensitive epilepsy and therefore anyone with this condition is asked not to participate.

Eye tracking may be affected if you are taking certain medications or have certain conditions so I would ask you to self-exclude if any of the following are applicable to you;

(a) You are currently taking any neuroactive medications (i.e. antidepressants or anti-anxiety medicines)
(b) You are pregnant
(c) You have cirrhosis of the liver
(d) You have photo sensitive epilepsy (there is a possible risk to you)
(e) You have schizophrenia

I have contact lenses/glasses, can I still take part?

Yes. There should be no problem with anyone who wears glasses or contact lenses. As long as you have sight in both eyes and are happy to wear your glasses or contact lenses as you would normally when watching a computer screen.

Will my participation be confidential?

Data will be kept confidential and be managed under the Data Protection Act. It will be kept on password-protected computers on a secure network. Wherever possible your data will have your identifiable information removed, but this is not completely possible in regards to the audio recordings. However, these will only be used for transcription purposes and heard by the researcher and supervisors.

What happens if I change my mind?

If you wish to change your mind please contact the researcher Sue Faulds. Your data will then be removed from the study without penalty to you. You can withdraw at any point.

What happens if something goes wrong?

If you have a concern or a complaint about this study you should contact the Research Governance Office (Address: University of Southampton, Building 37, Highfield, Southampton, SO17 1BJ; Tel: +44 (0)23 8059 5058; Email: rgoinfo@soton.ac.uk.

If you remain unhappy and wish to complain formally the Research Governance Office can provide you with details of the University of Southampton Complaints Procedure.

Where can I get more information?

Please contact Sue Faulds on either sjf2@soton.ac.uk or by phone on 02308597952. A copy of the full protocol can be made available to you and any questions you may have be answered.

I am happy to be involved, what do I do now?

Please complete the enclosed form and leave it for me in a sealed envelope in the internal post or e mail me on sjf2@soton.ac.uk . As soon as I have received this I will be in contact with you.

Thank you for reading this.

Appendix H - Video Segments used in the Analysis in the Phase Two Experiment

Segment one

One of the key tenets in expertise is the identification and use of cues, as this demands both perceptive and cognitive processes. Scenes 1, 2, 3 and 4 are brought together to create segment one, as during this the patient complains of shortness of breath. This is a significant cue and one which the students within the scenario should react to by gathering more information from the patient and connecting the monitoring. During this segment the students and nurse each approach the patient and introduce themselves. The nurse quickly leaves the scene and the three students start to ask questions of the patient to ascertain how he is feeling. As the patient complains of shortness of breath the students debate starting oxygen and agree that they first need to take the patient's physiological observations. The students connect the oxygen saturation probe and blood pressure cuff to the patient, verbalising their structured assessment and explaining to the patient what they are doing. The oxygen saturation reads 90% and the students recognise this as low, commencing oxygen therapy via a mask connected to the wall supply. As the segment ends the patient is about to be sat up in bed.

During this segment there is a lot of verbal and physical interaction with the patient, as each of the students is involved in the gathering of information. Whilst the students do attempt to undertake a structured assessment there is some confusion over the ordering of actions; however, they do gather the information and act appropriately.

This segment was chosen to see how the participants would initially approach the scenario, would they look to stay quiet and scan, or would they immediately start critiquing and verbalising what they have seen?

Segment two

Segment two starts with a student off screen talking to a doctor, while the two students who remain with the patient are stood initially not talking to him and looking at their colleague who is on the phone. The patient then complains of pain in his chest and the student on the phone can be heard telling the doctor that the patient has chest pain and is tachycardic. There is a discussion between the two students at the bedside about the patient's saturation levels and they decide to sit him up. The segment ends as the nurse enters the screen at the end of the bed and the student

returns after having finished her conversation with the doctor and being instructed to give intravenous fluids.

During this segment the important cue given by the patient is the report of chest pain and it is of interest how the students react to this. There is less action than in the other two segments but a lot of information is given off screen. This segment was chosen as it was apparent in the first phase that when there was information being given off screen the viewer chose to listen to this and incorporated it into their verbal utterances.

Segment three

The third segment is comprised of scenes 22 to 30 (inclusive) at which point the video stops. It starts with the patient complaining of feeling 'weird' and that their 'heart is racing'. During this segment the patient deteriorates with the students responding to this (in scene 26 the patient is confirmed to be in cardiac arrest). This scenario again contains a key cue from the patient that the students in the video should respond to, i.e. that they feel 'weird' and that their heart is racing, both verbal cues that the patient may be experiencing a cardiac event. It is also a key verbal cue to the viewer, and offers them an opportunity to comment on what is happening and to show their own knowledge. During this segment two students and the nurse are at the bedside with the third student off screen and on the phone to the doctor. The student off screen can clearly be heard providing the doctor with information about the patient's condition, and when the patient stops breathing ends the call saying 'I have to go it's a medical emergency'. The two students at the bedside quickly recognise that the patient has stopped breathing and act to move the bed into an appropriate position in order for cardiopulmonary resuscitation (CPR) to take place. During this time they have trouble removing the back of the bed but once they have assessed the patient and conformed that he is not breathing they start chest compressions. In scene 27 the students have established chest compressions and are attempting to ventilate the patient with the bag valve mask when the doctor arrives, and the student doing compressions at that time continues to do so whilst handing over to the doctor. In scene 28 the automated external defibrillator (AED) is connected to the patient's chest and after it has analysed the patient's heart rhythm a shock is recommended. At this point the oxygen is still on the patient's face (a safety issue as it requires removal before the shock is delivered as this is a fire risk) and the nurse is trying to give the students aprons. The oxygen is removed just before the student delivers the shock to the patient and compressions then starts again. The scene continues with the students delivering CPR whilst the doctor is thinking aloud the possible causes and a dialogue between the students and the doctor is established. The video then ends.

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