

**HOW CLINICIANS THINK:
CHANGING GEAR TO ARRIVE AT THE RIGHT DIAGNOSIS**

*An exploratory study on the transition from the routine to the effortful mode
of clinical reasoning.*

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SUMMARY

In order to arrive at the right diagnosis and thereby prevent diagnostic error and patient harm, changing gear by making the transition from a more routine to a more effortful mode of clinical reasoning, when needed, is crucial. Although many studies have emphasized the importance of this so-called *slowing down*, only a few have tried to explore it in action. Moreover, as it concerns a crucial component of clinical reasoning every student should be competent at it, however no educational material focuses on this phenomenon yet. To understand how *slowing down* should be taught one must first gain understanding on how the transition to the more effortful mode of clinical reasoning is made in practice. The current research therefore explored *slowing down* in clinical reasoning among clinicians who have patient contact in the polyclinic. This was done by interviewing and observing radiologists that are conducting their daily tasks. During their work, five radiologists were interviewed before a consultation with a patient, observed during the consultation and again interviewed afterwards. These instruments made it possible to link thoughts and actions as actions could be observed and by the researcher, while the participants could verbalize what they did, why they did it and what they thought at that particular moment. During fourteen of the forty-one observed consultations the transition to the more effortful mode of clinical reasoning was made. Due to a missing post interview, one of these cases was excluded, resulting in a total of thirteen *slowing down* cases analyzed. The analysis of these cases resulted in the identification of four distinct forms of making the transition to the effortful mode: *shifting*, *checking*, *searching* and *focusing*. Furthermore several triggers that initiate these forms of *slowing down* were found: a patient statement; the ultrasound screen that shows an unknown, unlikely of unexpected image; and the ultrasound that does not show anything as it shows no abnormalities or a blurred image. In addition to these findings, the results show that making the transition from the more routine to the more effortful mode of clinical reasoning is something that can be observed. Moreover, there can be concluded that it concerns a phenomenon that can be measured. With these insights a step towards educating student to *slow down* can be made.

KEYWORDS: Clinical reasoning • Expertise • Slowing down

INTRODUCTION

Coping with poorly defined problems and having to make decisions under time pressure based on limited information, is part of everyday practice for many professionals (Eraut, 1994). In order to deal with such problems expert judgement is significant. Especially for clinicians, as diagnostic errors can have major consequences and harm patients. To come to the right diagnosis they engage in clinical reasoning, a key competence that involves analyzing the problem of the patient, establishing the diagnosis and deciding on a treatment (Ledley & Lusted, 1959). Expert judgment in this process concerns *slowing down* when you should: for right diagnosing and avoiding medical error a clinician should, when needed, make a transition from a routine mode of reasoning to an effortful mode of reasoning (Moulton, Regehr, Mylopoulos and MacRae, 2007). As *slowing down* concerns a crucial component of clinical reasoning it should be a competence that every student should learn, however no educational material focuses on this phenomenon yet.

Although there is emphasized that clinical reasoning should be included in medical curricula, it appears to be difficult to teach as there is no one best way to reason through a problem and consequently no perfect way of teaching (Eva, 2005). Moreover, in line with Moulton et al. (2007), Norman (2005) highlights that expertise in clinical reasoning is associated with the way experts use their knowledge and skills in order to solve the problem. As a consequence of different modes of reasoning the expert possesses adaptability to be able to provide effective care. Hence, for students to become expert clinician, they should learn how experts reason and 'work' with their knowledge. As such, students should be taught why and how clinicians *slow down* and make the transition from the routine to the effortful mode of clinical reasoning.

Several studies in both the medical and non-medical context emphasize the importance of *slowing down* in a timely manner to come to a right decision or diagnosis (Moulton et al., 2007; Norman & Eva, 2010), yet, with regard to clinicians, only a few have described or studied the phenomenon (Schön, 1983; Moulton, Regehr, Lingard, Merrit and MacRae, 2010a; Moulton, Regehr, Lingard, Merritt and MacRae, 2010b). Moulton et al. (2010b) studied the phenomenon in action, with surgeons that operate their (anesthetized) patients, but no in action research with regard to *slowing down* in clinical reasoning during patient contact has been conducted yet. Insight in *slowing down* during patient contact is needed, to be able to teach it to students.

Hence, in order to understand how *slowing down* should be taught one must first gain understanding on *slowing down* and how it works in practice. Therefore, this study focuses on the process of *slowing down* in clinical reasoning among clinicians who have patient contact in the polyclinic. More specifically on how *slowing down* takes place and which initiators trigger the transition. This will be done based on observations of and interviews with radiologists before, during and after patient contact. The results of the research will contribute to clinical reasoning theory, especially theories focusing on *slowing down* as it explores the phenomenon during consultations (in action). The outcomes of this study could be used to structure training programmes focused on the development of expert judgement.

THEORETICAL FRAMEWORK

EXPERTISE

In all occupations there are individuals who execute their tasks exceptionally well and who are competent to do the right thing at the right moment (Holyoak, 1991). These individuals could be described as experts. However, in case of well-defined situations, almost everybody is able to do this right thing at the right time. Whereas many problems are not well-formed structures with an evident approach and they are often characterized by conflict and uncertainty. How one deals with such challenging situations reveals whether someone can be called an expert or not (Schön, 1983). Schön (1983; 1987) emphasizes that experts are problem-solvers who are able to select resources that best fit with the particular problem, also when this concerns an ill-defined problem. He describes the behavior of experts in terms knowing in action, reflection in action and reflection on action.

Knowing-in-action concerns the non-analytical resources and knowledge one uses in daily practice. This concerns routinized thinking and work that is executed without reflection (Schön, 1983; 1987). However, when confronted with unexpected events the need to improvise becomes imperative. This is what Schön (1983; 1987) calls reflection-in-action: the ability to react on the event that is happening and think about what one is doing while one is doing it. It concerns a moment at which one reflects on what he or she is doing and what should be done to solve the ill-defined problem. After the problem is solved reflection-on-action can take place in an attempt to make sense of an event and learn from it.

In practice this means that a problem can appear as routine, while in actuality it is a non-routine and ill-defined problem. Many non-experts would handle this as a routine problem, however an expert will respond effectively to the ill-defined problem by shifting from knowing-in-action to reflection-in-action. Afterwards, to learn from the non-routine problem, reflection-on-action can give insight to what actually happened and how one handled it.

Schön's work is extensively referenced, describing how experts know-in-, reflect-in- and reflect-on-action (e.g. Hatano and Inagaki, 1986). However, several researchers also criticize his work. For example Greenwood (1993) emphasizes that Schön (1983; 1987) fails to recognize the importance of reflection-before-action, which refers to thinking through what and how one intends to do something, before it is actually done. He emphasizes that including reflection-before-action might reduce error. Moreover, Eraut (1995) particularly criticizes the reflection-in-action and concludes that *"While strongly supporting his view of the significance of knowledge creation by working professionals out of the academic context [...] I am not convinced that this results may form reflection-in-action rather than more deliberative reflection out of the action."* (p. 21). He states that Schön does not sufficiently clarify what the reflective process entails. In addition, Eraut (1995) argues that speed necessary for making decisions in the professional setting is not taken into account. For example, when clinicians treat a patient, decisions may need to be made fast, especially in case of an unexpected event (e.g. a bleeding). In that case the clinician has to identify the issues, decide what to do and proceed in a state of alertness. Eraut (1995) states that such a process might be (quick) problem solving instead of taking a time-out, to reflect-in-action on the event.

In contrast to the criticism, Hatano and Inagaki (1986) interpret the absence of reflection-in-action in the case described by Eraut (1995) as a difference in expertise. They mention that not everybody is able to identify and subsequently react on an ill-defined problem. This results in two types of experts: adaptive experts who will take (short) time for reflection-in-action and routine experts who will not do that. Routine experts can be considered as highly skilled professionals who have learned complex routines that they apply efficiently and effectively in practice. However, when they face a novel problem, they will continue using their routines in an attempt to adapt the problem to solutions they are familiar with instead of adapting solutions to the problem. In contrast to this, adaptive experts will adapt their solutions to the novel problem and stretch the boundaries of their competencies and knowledge (Hatano and Inagaki, 1986). This type of expertise does not just simply

develop from acquiring certain knowledge and skills in a domain, but concerns an active process in which someone challenges his- or herself and thereby transforms knowledge and skills in that domain.

CLINICAL REASONING

Clinical reasoning is considered to be a key competence of clinicians and is used interchangeably with synonyms such as clinical problem solving, clinical decision-making, diagnostic and clinical judgement (Banning, 2008; Higgs, 2008; Ledley and Lusted, 1959; Nikopoulou-Smyrni & Nikopoulos, 2007; Norman, 2005). It refers to thinking about clinical practice and the subsequent decision-making process (Higgs, 1992) and can be described as reasoning through various aspects of patient care aiming to come to a reasonable decision with regard to the diagnosing, preventing, or treating a (clinical) problem (Hawkins, Paul & Elder, 2010). Moreover, clinical reasoning can be a complex process as it involves several interacting elements; the nature of these elements can vary between cases and clinicians. Variables related to the case include the setting of the case (context) and the signs and symptoms of the patient (content) (Durning, Artino, Pangaro, van der Vleuten and Schuwirth, 2011), while variables regarding the clinician concern the level of expertise and experience of the clinician (Schmidt, Norman and Boshuizen, 1990).

Clinical reasoning is underpinned by theory that describes two types of reasoning: analytical and non-analytical reasoning. Non-analytic reasoning is depicted by pattern recognition, as expert clinicians have formed illness scripts (Schmidt et al. 1990). These illness scripts are the product of the integration of clinical knowledge and experiences of the clinician. The illness script theory describes that through experience experts have developed knowledge networks that are adapted to clinical tasks and are thereby enacted autonomously (Charlin, Boshuizen, Custers, & Feltovich, 2007; Stanovich and West, 1998). Based on contact with patients and exposure to their problems these scripts are formed. They consist of associative links between illnesses and their consequences, attributes, treatment or investigation as well as previous forms of the illness the clinician has encountered. When situations are ambiguous clinicians often search for a fit between the information that is available and the appropriate scripts (Charlin, Boshuizen, Custers, & Feltovich, 2007).

Analytical reasoning concerns the testing of hypotheses and deliberate verification (Hancock & Easen, 2006). In contrast to the automatic component in non-analytical reasoning, analytical reasoning is characterized by deliberate reasoning. Clinicians rely on their clinical knowledge by collecting the patient features and mapping them to known symptoms and signs associated with certain diseases. For this they engage in reasoning with their biomedical knowledge to come to the diagnosis (Kirschner, 2002).

For a long time, these approaches were described as two independent different types of clinical reasoning, however the dual process theory, as proposed in both the non-medical and medical context (Epstein, 1994; Kahneman, 2011; Normand & Eva, 2010), presupposes that (clinical) reasoning concerns the interaction between these non-analytical and analytical form of reasoning. They are used in varying degrees dependent on the operating variables (Evans, 2008; Norman and Eva, 2010; Smith & DeCoster, 2000). As long as new information matches the active illness script of the expert, non-analytical reasoning is sufficient. However, in cases of conflict the expert needs to make a transition towards analytical reasoning, drawing on biomedical knowledge (Higgs, 2008). The fast non-analytical processing enables efficiency and when needed analytical thinking 'checks' and balances the other.

Hence, in line with the theory of Schön (1983; 1987) medical research describes experts as individuals that use both analytical (knowing-in-action) and non-analytical (reflection-in-action) reasoning in diagnosing patients. Moreover, as clinicians need to prevent diagnostic error and patient harm, these theories suggest that clinicians have to be adaptive experts that notice when this transition to analytical reasoning is needed. Only then, they will be able to draw the right diagnosis.

SLOWING DOWN IN CLINICAL REASONING

Expert clinical judgment is a crucial part in clinical reasoning and in this *slowing down* by making the transition to analytical reasoning is essential. Moulton et al. (2007) state that *slowing down* when you should concerns the ability of an expert to effectively respond in the moment, using non-analytic reasoning, and transition appropriately to analytical reasoning when needed. They state that as clinicians face many uncertainties and challenges during their daily clinical activities they need to be competent at detecting, understanding and responding effectively to cues in the environment.

Different from Epstein (1994) and Schön (1983), Moulton et al. (2007) describe transitioning from non-analytical to analytical reasoning or going from knowing-in-action to reflection-in-action in terms of transitioning from the routine to the effortful mode of clinical reasoning: *slowing down*. Table one provides an overview of these different terms and how they relate to each other. In order to be

consistent, the concepts transitioning from the routine to the effortful and *slowing down* (Moulton et al., 2007) will be used for the remainder of this research.

Table 1.

Overview of terms for the same phenomena

Authors	Term 1	Term 2	Term 3
(Schön, 1983)	Knowing-in-action		Reflection-in-action
(Epstein, 1994)	Non-analytical		Analytical
(Moulton et al., 2007)	Routine	<i>Slowing down</i>	Effortful
	Definition term 1	Definition term 2	Definition term 3
	Form of clinical reasoning in which the individual works in a routine mode and relies on the recall of knowledge in the form of pattern recognition and illness scripts.	Making the transition from routine to effortful clinical reasoning.	Form of clinical reasoning in which the individual engages in a more attentive mode and relies on (biomedical) knowledge.

Initiators and influences on slowing down

Much is written about making the transition from the routine to the effortful mode of reasoning when needed, a moment that is described in different terms: Schön (1983) talks about an unexpected event, Higgs (2008) mentions that ‘in cases of conflict’ experts should *slow down* and Hatano and Inagaki (1986) mention that an ill-defined problem leads to the transition. However, less is written about the actual initiators of *slowing down*. As it was not defined yet what these unexpected events, cases of conflict or ill-defined problems meant in practice, Moulton et al. (2010a) constructed a conceptual framework that focuses on the initiators and influences on this transition. Figure one describes this framework that they constructed focused on surgical practice, it will be explained in terms of clinical reasoning during patient contact in the policlinic.

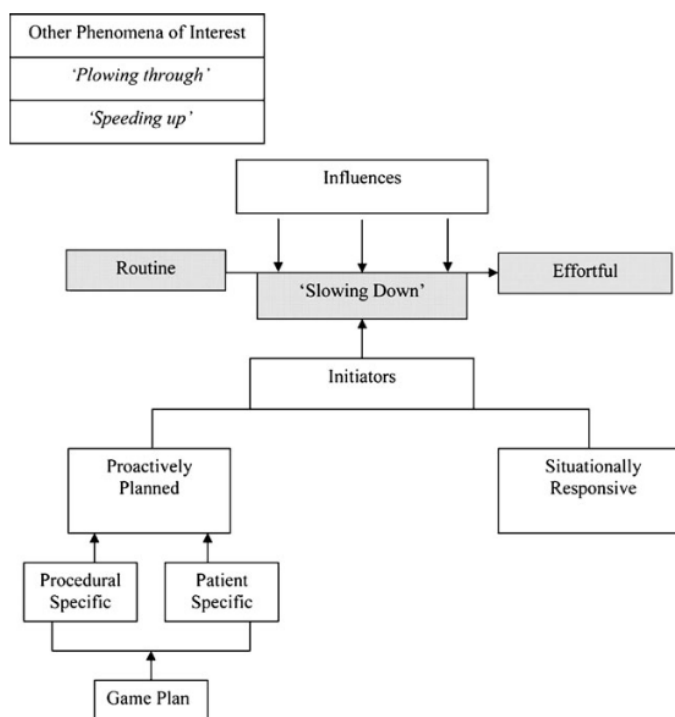


Figure 1. Conceptual framework for the *slowing down* phenomenon as proposed by Moulton et al. (2010a)

Proactively planned initiators

Prior to contact with a patient a clinician often makes a problem representation and describes critical points that he or she recognizes in advance. This is a so-called game plan, which describes the procedural- and patient-specific checkpoints that the clinician will probably encounter during the consultation. Procedural-specific points are encountered whenever that procedure is executed

(Moulton et al., 2010a). For example, when making an ultrasound, some organs are difficult to get on screen, in order to see them properly the clinician always makes the transition to the effortful mode in these cases. The patient specific factors concern those factors planning for the potential risks and intricacies of the specific patient. For example, the clinician can take into account that the patient is in a wheelchair, making *slowing down* needed at certain moments during the physical examination. By preparing and understanding where obstacles are for the given procedure and patient, clinicians will feel better prepared to manage them properly, or avoid them when necessary (Moulton et al., 2010a). When the anticipated point occurs, the clinician will intentionally make the transition from the more routine mode to the more effortful mode.

Situationally responsive initiators

Even with preplanning, clinicians will encounter situations in which they have to react to unexpected events. For example when a radiologist finds something unexpected on a scan. The unexpected event makes that the clinician needs to take a step back and reassess the whole situation. This requires a transition to the more effortful (Moulton et al., 2010a).

Influences

Moulton et al. (2010a) also describe other factors influencing the process: influences. They differ from initiators as they do not directly cause the transition, but affect it. Table two describes all initiators that concern transitory factors, such as fatigue and endurance; personality factors, such as confidence and ego; and situational factors, such as time pressure and distractions.

Table 2.

Influences on slowing down behavior (Moulton et al., 2010a)

Transitory factors	Internal, personality factors	Situational factors
Fatigue	Adaptability	Time pressure
Endurance	Confidence	Hierarchical pressure
Physical ailments	Humility	Distractions
	Fear of doing harm	Availability of resources
	Willingness to learn	Teaching pressures
	Fear of losing reputation	Team consideration
	Ego	Social pressure
	Greed	
	Mindfulness	

Other phenomena of interest

There are two situations that differ from *slowing down*: *speeding up* and *plowing through* (Moulton et al., 2010a). With *plowing through* the clinician recognizes, in retrospect, a moment where he or she should have *slowed down*, but did not. This can be because he or she was unaware of, or did not appreciate, all information available, for example by not taking into account some complaints a patient mentions. Another situation is the unexpected presence of a life-threatening event, for example a significant bleed, which can lead to *speeding up*: finishing a task and/or procedure faster.

Different forms of slowing down

Continuing doing research regarding the *slowing down* phenomenon, Moulton et al. (2010b) tried to identify and characterize *slowing down* by observing surgeons in the operating room. This study shows that it can occur in different forms: *stopping*, *removing distractions*, *focusing more intently* and *fine-tuning*. *Stopping* is the most extreme form and often concerns a moment during which the surgeon experiences too much uncertainty. As a result the surgeon stops the procedure in an attempt to gather information that is needed to continue. *Removing distractions* concerns a less intense form of *slowing down* during which the surgeon removes the distractions from the environment that he or she finds distracting. Removing these distractions allows the surgeon to focus on the task. In regard to *focusing more intently* the surgeon focuses his or her attention exclusively towards the procedure without feeling the need to remove or control distractions. More specifically, the surgeon withdraws him- or herself from all things taking place in the room (e.g. conversations) to focus on the procedure. Furthermore, *fine-tuning* is characterized by minor transitions from the routine mode to the more effortful mode. During this form of *slowing down* the surgeon often continues to participate in the conversation that takes places in the operating room, or pauses briefly to focus on the operation.

Moulton et al. (2010b) mention that this is the subtlest form of *slowing down* that is often not even noticed by other members of the operative team.

By conducting different studies focusing on the *slowing down* phenomenon in surgical practice, Moulton et al. (2007; 2010a; 2010b) have thus given an overview and description of what the transition to the more effortful mode looks like and what initiators and influences lead to it. These results provide valuable insights regarding *slowing down* during surgical practice and raise intriguing questions regarding the occurrence of this phenomenon during patient contact in the polyclinic.

RESEARCH QUESTION

Much research has focused on the value and interaction of routine and effortful processes (e.g. Norman, 2005). Other studies describe the importance of *slowing down*: how it occurs and what initiates it (e.g. Moulton et al., 2010b). Moreover, in action research is conducted into the *slowing down* phenomenon focused on surgical practice, which involves anesthetized patient who do not talk. However, although many clinicians have to diagnose patients on a daily basis, while being in contact with them, no research has focused on *slowing down* during clinical practice that involves patient contact yet. In addition, there is no clear overview of what the exact initiators for making the transition are. Hence, a gap in literature can be found with regard to in-action research exploring *slowing down* in clinical reasoning during patient contact in the polyclinic. Therefore, the *slowing down* phenomenon will be studied in action in this research, exploring what it looks like and what initiates the process. The following research question and sub-questions are drawn:

How do expert clinicians make the transition from the more routine to the more effortful mode of clinical reasoning during patient contact in the polyclinic?

- What does the transition from the more routine to the more effortful mode of clinical reasoning look like?
- What initiators cause the transition from the more routine to the more effortful mode of clinical reasoning?

METHOD

RESEARCH DESIGN

Many scholars argue that clinical reasoning is only revealed in action and that this action incorporates the influence of the context of the clinical encounter (Durning et al., 2011). For exploring clinical reasoning it was therefore of importance that there is focused on the "*phenomenon of some sort occurring in a bounded context*" (Miles & Huberman, 1994, p.25). Hence, an explorative observational study was conducted, focused on the *slowing down* phenomenon that occurred during clinical practice. To capture how the phenomenon took place and what the thoughts of the clinician were at that moment, the research executed combined interviews and observations.

To ensure that rich data would be collected, the medical specialization in which the highest likelihood of encountering the *slowing down* phenomenon was selected. This would be the case with specializations in which clinicians work with data in action: new data is gathered during the consultation. It appeared that radiologists were suitable participants as they work with ultrasounds and scans, providing them with hands-on clinical data during the consultation. Furthermore, the actions of radiologists (imaging) are clearly observable and they often verbalize what they do and see. These factors made that the *slowing down* phenomenon would most likely be encountered during observation.

Specializations such as gynaecology, the emergency room and psychiatry also work with data in action, however due to (more) ethical concerns in these specializations they were not included in the research. In radiology ethics obviously also play a role, but as these concerns are less there is focused on this specialization. Still, to ensure that these ethical concerns were covered, both the ethical committee of the Academic Medical Centre (AMC), Netherlands Association for Medical Education and the University of Twente approved the study.

PARTICIPANTS

Radiologists of the radiology department of the AMC were asked to participate in this research. This focus on a particular group makes that purposeful sampling was applied (Frankel & Devers, 2000), in

particular expert sampling: knowledge from individuals with a particular expertise was needed. Moulton et al. (2007) mention that expertise should not be considered from an achievement but from a process perspective, which makes that “*expert judgment from this perspective allows fluctuations in individual performances and provides an explanation of why a resident may behave in a expert manner, exerting expert judgment...*” (Moulton et al., 2007, p114). Following this definition of expertise, five radiologists participated (radiologist, n=1; resident, n=4) in this research. These participating radiologists differed in the stage in their career, with one expert radiologist and four residents that were in different stages of their medical specialization (1.5 years, n=1; 2 years, n=2; 5 years, n=1).

Although patients (n=41) were not the focus of the study, they were present during the consultation, which made that their permission for participation was also needed. Therefore both the radiologists and the patients were asked to participate in the research and to fill in the informed consent.

PROCEDURE

Including the preparation and reporting of it, a consultation consisted of three parts. Moreover, the radiologists that were still in training had to discuss their images with their supervisor, which made that the consultation consisted of more parts. This resulted in two types of consultations observed, table three describes these different procedures of the consultations.

Table 3.

Procedure of the consultation

Independent		With supervisor	
1.	The radiologist prepares the consultation by, among others, reading the referral and the patient file		
2.	The consultation with the patient takes place;	2a.	The consultation takes place during which the radiologist discusses the complaint and makes images with the ultra sound. Thereafter he or she excuses him- or herself to the patient and goes back to the computer.
		2b.	At the computer the radiologist discusses the images and findings with his or her supervisor.
		2c.	The radiologist goes back to the client and dependent on the type of complaint and/or findings the supervisor will then accompany the resident to check his or her imaging and to help out when needed.
3	The radiologist reports the visit, findings and (possible) referrals.		

As the research was conducted in the natural environment of the radiologist, who is doing his or her work, this flow of the consultation was followed for the procedure of the research. Before the consultation the researcher interviewed the radiologist about the scheduled patient, after which they entered the consultation room. When the scheduled patient had refused to participate in the study, the researcher left the consultation room. Otherwise the patient would hand in the informed consent, the study would be explained and the patient would get the chance to ask questions. Then the consultation started and the researcher observed and audiotaped the interaction. In case the discussion with the supervisor would take place (2b in table 3) this would also observed and recorded. Afterwards, these observations and the interpretations of *slowing down* from both the researcher and radiologist would be discussed.

INSTRUMENTS

In order to capture *slowing down* and its initiators, a pre-interview during the preparation, observation during the consultation and a post-interview during the reporting were conducted. The pre-interview was conducted to get clear pro-actively planned triggers that would initiate *slowing down*. Thereafter, the observation was for observing what initiators lead to *slowing down* behaviour and how this

behaviour was enacted. Last, the post interview was conducted to verify if these observations of *slowing down* and the accompanying initiators were correct. The researcher, who did not have any medical knowledge, executed all this. Below the instruments are explained, including exemplifying quotes.

Pre-interview

A semi-structured interview was conducted with the goal of getting clear what the type of patient problem was (*“what is the reason for her visit?”*), what the radiologist expected to find (*“and with regard to that liver, what do you then expect to see?”*) and how he or she would handle the examination (*“And as you indicate that it will be more difficult to see, will you then look in a different manner at the liver than the rest of the organs?”*). Furthermore the researcher asked what the differential diagnosis of the radiologist was: a list of diagnoses that can suit a particular complaint (Grundmeijer, Reenders and Rutten, 2004). Additional information with regard to drafting a differential diagnosis can be found in Appendix A. During the interview the pre-planned initiators that would lead to *slowing down*, as proposed by Moulton et al. (2010a), were also discussed. This pre-interview was conducted when the radiologist simultaneously went through the file of the patient, reading the information he or she needed for the consultation.

Observation

Unobtrusively the researcher observed the clinician during the consultation. During this the points mentioned during the pre-interview were taken in account, which concerned the described expected patient problem, differential diagnosis, the handling of the examination and what the radiologist had described as pre-planned initiators. When one of the pre-planned initiators would take place this could namely initiate a transition to the effortful mode of clinical reasoning. In addition, in case the expected patient problem, the differential diagnosis of the handling of the examination deviated this could also initiate *slowing down*.

To be able to say something about what the transition to the effortful mode looks like and what initiates it, the behaviour of the clinician was observed, taken both non-verbal behaviour and verbal behaviour into account. With regard to the non-verbal behaviour no fixed observation scheme was developed, as in advance there could not be known what non-verbal behaviour would take place. The researcher would note down behaviour that she interpreted as *slowing down*, and would verify that during the post interview. This resulted in two types of (possible) non-verbal *slowing down* behaviour: looking confused and looking concentrated.

For observing the verbal behaviour, observation points were fixed with regard to the content of interaction between the radiologist and the patient. This was based on the phases of the consultation described by Veening, Gans and Kuks (2009): acquaintance, contact and motive, anamnesis, physical examination, diagnosis, intervention, and completion (see Appendix B for the explanation of these phases). Questions could indicate *slowing down*, for example when there would be returned to anamnesis questions at the end of the physical examination phase. Moreover the amount of questions could demonstrate that a transition was made to the effortful, as asking a lot of questions could indicate indistinctness.

In addition to these phases it appeared during the data collection that not responding to the patient (who told something) was often also a point of interest, likewise the radiologist who pronounced incomprehension. These points were therefore also taken into account in the preceding consultations and the behaviour was marked in previous recorded and transcribed consultations. Table four gives an overview of these points of interest during observation.

Table 4.
Points of interest during observation

Verbal behaviour	Non-verbal behaviour
Phase of consultation (questions asked)	Confusion
Incomprehension	Concentration
Not responding	

During the discussion with the supervisor the researcher could observe the radiologists even more unobtrusively as, in most cases, the resident and supervisor would be focused on the images of the patients and discuss things thoroughly. As they discussed their thoughts about the (problem of the) patient their clinical reasoning and possible *slowing down* would be verbalized, without the

researcher needing to ask for it. This enabled the researcher to observe the radiologists enacting their natural behaviour and verbalizing their natural thoughts.

Post interview

After the consultation the researcher, radiologist and sometimes the supervisor discussed their interpretations of events in a semi-structured post interview. In most cases the radiologist directly verbalized what happened during the consultation, otherwise the researcher would ask it directly (*“Would you describe this as slowing down behaviour?”*) or give her interpretation of certain behaviour enacted by the radiologist (*“In this case I really saw you searching for something, do you then work more concentrated, as you can’t see something?”*). These remarks were based on the observed non-verbal and verbal behaviour observed and the points mentioned in the pre-interview that did or did not occur.

DATA PREPARATION

All pre-interviews, consultations and post-interviews were audiotaped and subsequently transcribed verbatim. To ensure that no impressions were forgotten of the data, the audio recorded were transcribed as soon as possible after the data collection. The transcripts included both the utterances of the researcher, radiologist(s) and the patient during the pre-interview, consultation and post-interview. In a few transcripts certain actions performed by the radiologist or patient were also mentioned (e.g. the radiologists makes images with the ultrasound, or the patient puts his hand on his back), to ensure that the situation was clearly described. Finally, 41 cases, lasting 15 hours in total, were transcribed covering 162 transcript pages.

DATA ANALYSIS

The interview and observation data was analysed using ATLAS.ti software and consisted of three steps: the first selection, the within case analysis and the cross case analysis. For all steps the process of data reduction, data display and conclusion was followed (Miles and Huberman, 1994).

First selection

First, a distinction was made between consultations in which *slowing down* took place and those in which it did not take place. Table five gives an overview of how many consultations per clinician were observed and in how many of these cases *slowing down* took place.

Table 5.

Overview of number of consultations observed and number of slowing down consultations

Clinician	Number of consultations observed	<i>slowing down</i>
1	7	2
2	7	2
3	12	5
4	10	4
5	5	1
Total	41	14

As the post interview of one of these consultations was missing it was impossible to get insight into the thoughts of the clinician with regard to that case. Therefore this consultation was excluded from the analysis, resulting in a total of thirteen *slowing down* cases that were analysed.

Within case analysis

According to Patton (2002) analysing qualitative data can be done by either starting with a within case analysis or a cross case analysis. The first focuses on the patterns and content of the answers of one individual participant, which can be considered a vertical approach. While the cross case analysis can be considered a horizontal approach, focusing on the variations of answers given to one topic across all the cases. In this research both analysis forms have been conducted, starting with the within case analysis.

The within case analysis was essential for the researcher to get the in-depth information of each case, as for all cases it had to become clear how the *slowing down* phenomenon took place and which triggers led to it. Therefore a factual description was required for each case (Miles & Huberman, 1984), which was done with two things. First, based on the consultation phases proposed by Veening, Gans, and Kuks (2009), a deductively based codebook was made for the observed consultations, with descriptive codes for the content of the radiologist-patient interaction (see appendix C). Subsequently,

a flowchart, visualizing the flow of the phases in the consultations could be made. Figure two visualizes this for consultation one, with the numbers representing the codes (categories: 1=acquaintance; 2=anamnesis; 3=physical examination; 4=diagnosis; 5=intervention; 6=completion) the exact codes can be found in Appendix C. Below the consultation phases there is indicated when the ultrasound and thereby the physical examination starts (<...>) and the D indicates that the resident radiologist discusses his or her findings with the supervisor.

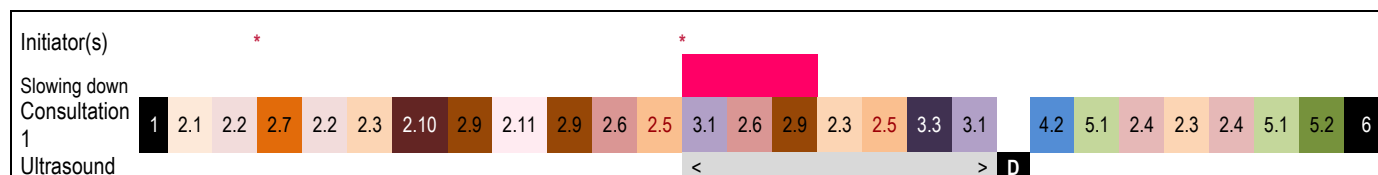


Figure 2. Flowchart of consultation one

Moreover, the initiators shown in the flowchart were derived from the pre- and post interview data. These interviews were coded using both deductively, based on the *slowing down* model of Moulton et al. (2010a), and inductively based codes (see Appendix D). In addition to coded data of the pre- and post interview a summary of the thoughts of the radiologists was made (what triggers led to *slowing down* and what did they think at that moment), including factual information about the type of patient, what type of consultation it concerned and what the complaint was (see Appendix E). By this, the initiators (*) and *slowing down* (colored bar), also presented by figure two, could be included and thereby the whole consultation and *slowing down* moment could be visualized. Appendix F gives an overview of all these flowcharts that show how the different codes of the consultation codebook alternate. In the flowcharts in the appendix there is also indicated what initiators led to what type of *slowing down* (this is explained in the result section).

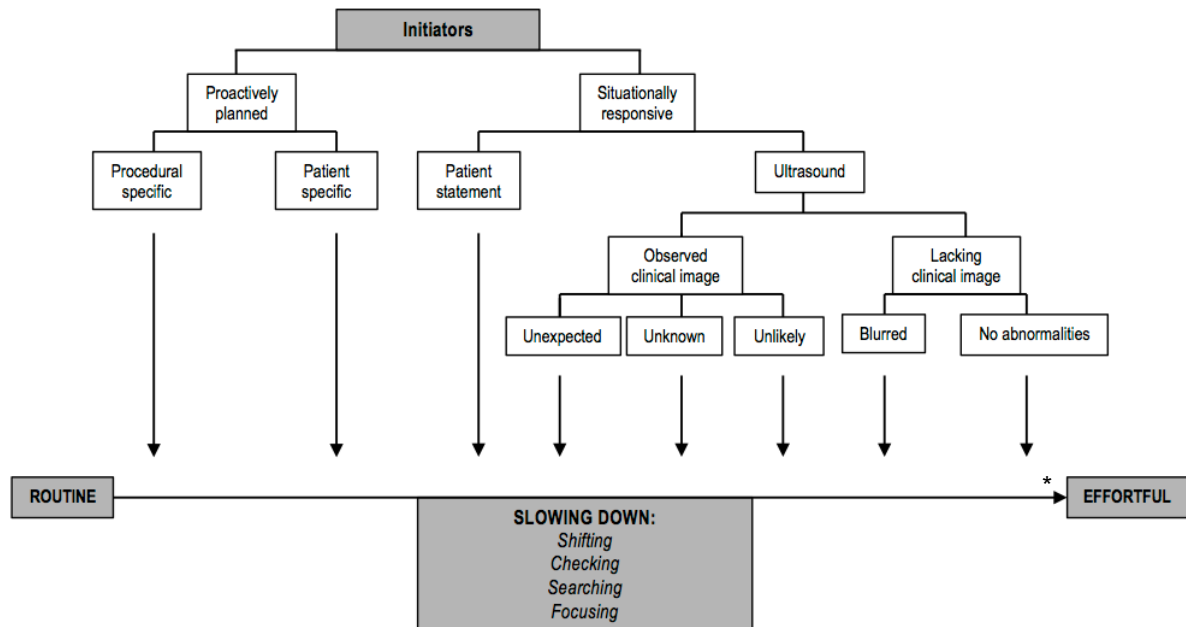
In order to ensure inter reliability with regard to the codebooks, a sample of two cases (10%) of the data was selected for a second coder. This coding round resulted in Cohen's Kappa's of: .85 (pre-interview), .77 (consultation) and .83 (post interview). Based on these outcomes the researcher and second coder discussed the codebook, after which the codebook was modified and some code definitions were clarified.

CROSS CASE ANALYSIS

Subsequently, based on the outcomes of the within analysis there could be determined whether there were similarities between the different cases: the cross case analysis. The intent of the cross case analysis was to reveal different forms of making the transition to the effortful mode of reasoning. To get clear why and how the radiologists *slowed down* the statements regarding the *slowing down* behaviour enacted by the radiologists were compared. Following the constant comparative method set out by Glaser and Strauss (1967) specific responses were identified and placed in a response category. Next, it was determined whether the *slowing down* response from other cases fitted in already identified categories. When this was the case, it was added, otherwise a new category would be defined. Eventually four categories were defined, that are explained in the result section. To pursue the trustworthiness of these categories a second coder was asked to categorize the summaries (appendix E) of all *slowing down* cases. With two cases placed in a deviating category, this resulted in a Cohen's Kappa of .80. To tackle the incongruence with regard to these two cases the researcher and second coder discussed them. Moreover, the second coder read the full transcripts of these two cases. As a result, one summary was rewritten and one case was re-categorized.

RESULTS

The within case analysis of the thirteen consultations gave insight into the initiators for making the transition from the routine to the effortful mode of clinical reasoning. Moreover, the cross case analysis resulted in an overview of four forms of *slowing down*. Based on the framework of Moulton et al. (2010a), a framework that describes (the forms of) *slowing down* and its initiators evolved from this study and is shown in figure three.



Note. *A transition can also be made from the effortful to the routine, as this is however not the focus of the study this arrow is not included.

Figure 3. Framework of initiators for different types of slowing down

INITIATORS

The thirteen individual cases displayed different initiators for *slowing down*, in line with the presented framework (figure three) these initiators will be explained.

Proactively planned

Procedural specific

Procedural specific initiators concerned critical points that the radiologist always encountered during specific procedures. For example the radiologist would describe what part of the procedure asked for additional attention such as:

“...when I have to get that side clear on the screen I know I have to push a bit harder and look more focused”

Patient specific

The patient specific initiators often concerned physical features of the patient. This could regard the posture of the patient (e.g. fat) but also a medical obstacle such as a dialysis, which made that the radiologist had to work more focused. Furthermore something such as a scarred organ (e.g. a liver) could be a pre planned trigger for *slowing down*. With one consultation the supervisor for example mentioned:

“When you see a lot of regeneration and a really nasty liver then I’d like to watch, since it is then really easy, also for me, to overlook HCC’s.”

Moreover, previous findings, such as scans, diagnoses, etcetera that resulted from earlier consultations, were also taken into account on beforehand. For example, the radiologist always checked things like a gallstone or lesion that had been found earlier. However, this did not concern

direct planned *slowing down* moments but rather points of interest that they took into account to prevent (unnecessary) *slowing down* when they would see them and think they found something new.

Situationally responsive

A patient statement or reactions of the radiologist on the image of the ultrasound screen were situationally responsive initiators, which made the radiologist reflect on his or her findings. Both types of triggers will be explained.

Patient statement

A statement could be (one of) the initiator(s) for *slowing down*. This could concern a statement regarding the medical history of the patient, such as previous complaints, something regarding the cause, or a statement about illnesses that are present within the family. But also a remark regarding the cause of the complaint could be a trigger, which was verbalized by one of the radiologists:

“Well he immediately told that the complaint started after a certain movement and although it could still be shoulder wear or something else, in this case it seems like it is torn.”

Ultrasound

In most cases *slowing down* was initiated by the ultrasound image that would either show or not show the clinical image for drawing a diagnosis. All the types of triggers will be described below.

- **Observed clinical image**

In case a clinical image did show something, three types of images observed could concern a transition.

- **Unknown**

In different cases radiologists made the transition to the effortful mode of clinical reasoning because the image the radiologist observed concerned something that he or she was not familiar with, something he or she did not recognize. As this image did not match any expected or known illnesses, *slowing down* was needed to find out what it was. One radiologist described such an unknown image initiator:

“Eh yes, this is something which I, something that doesn’t fit, something that can’t be reasoned in the context of clinical reasoning. This concerns something unexpected and something that isn’t just a standard disease.”

- **Unexpected**

A different initiator was an image that showed something the radiologist did recognize, however, as he or she had not taken the diagnosis in mind, prior to the consultation, it came unexpected. A transition to the more effortful mode was a consequence, as the radiologist needed to adjust his or her thoughts. The initiator was characterized by the fact that the radiologist instantly notices that the shown ultrasound image does not match the previous drawn differential diagnosis:

“Well, the moment you see this on the ultrasound, then you have to rely on eh... when you see this you know instantly that it isn’t a ganglion. [...] then, you’re also almost sure that it concerns something that is associated with, that has to be something gout-ish as otherwise you wouldn’t see a lump soft-tissue around it.”

- **Unlikely**

In other cases *slowing down* was initiated by the ultrasound that showed a clinical image that the radiologist had taken into account prior to the consultation, however as this concerned a highly unlikely diagnosis a transition to the effortful mode of clinical reasoning was made. In such cases the image showed clinical data that confirmed one of the ‘lower order’ differential diagnoses. These were ‘lower order’ diagnoses as it was less likely to find them (in that case). For example, a lot of patients that have had a tumour removed have an annual appointment to audit whether there is no metastasis. During the majority of such consultations no metastasis was found and radiologists indicated that in most cases it was not likely to find it. When they did find it that would initiate *slowing down*:

“...however, on the CAT-scan there was a small thing on the left side, which lies a little more to the edge and lower. As this differs I wanted to check it.”

- **Lacking clinical image**

In other cases *slowing down* was needed because the ultrasound image did not show anything, a lacking clinical image. This could either be because the ultrasound screen showed no abnormalities that could declare a complaint, or because the image was blurred.

- **No abnormalities**

When the patient indicated that he or she had a complaint or felt pain in a certain area, *slowing down* would be initiated when the ultrasound image showed no abnormalities. In this case an image on the ultrasound that should declare this complaint was absent, as the ultrasound screen showed a 'normal' clinical image.

- **Blurred**

A blurred image could also initiate a transition to the effortful mode, as the radiologist would not see everything clearly. This blurred image could be caused by certain patient features (e.g. scarred organs), but also by the patient who did not participate in the research (he or she did not react to breathing commands), for example:

"In addition, she did not cooperate at all, also with breathing, the breathing commands, she did not react to that at all, which caused a blurred image [...] that makes that you really have to concentrate on the ultrasound screen to see things."

FORMS OF SLOWING DOWN

From the fourteen individual cases in which *slowing down* took place, four distinct categories emerged. These categories reflect what type of *slowing down* took place, namely in the following forms: (1) *shifting*, (2) *checking*, (3) *focusing*, and (4) *searching*. Table six gives an overview of which type of slowing down occurred with whom and the number of cases per *slowing down* category. Furthermore, it indicates that one case of *slowing down* was excluded. Although a transition to the effortful mode took place in this case, it was not included in a category as the post interview was missing and therefore it was not possible to categorise it.

Table 6.

Number of slowing down consultations per category

Radiologist	Checking	Shifting	Searching	Focusing	Excluded
1		1	2		1
2	1	1			
3	2		1	2	
4				2	
5			1		
Total	3	2	4	4	1

Shifting

One of the observed forms of *slowing down* concerns *shifting*: during the consultation the radiologist encounters unexpected clinical data, which makes that he or she has to shift to a different diagnosis then he or she expected to draw in advance. This transition is triggered by an unexpected image of the ultrasound that shows clinical data that does not confirm any of the diagnoses in the predefined differential diagnosis, but confirms a (complete) different diagnosis that the radiologist did not take into account. However, he or she recognizes the illness and therefore makes a shift to the new diagnosis. In this data set two consultations were categorized as *shifting*.

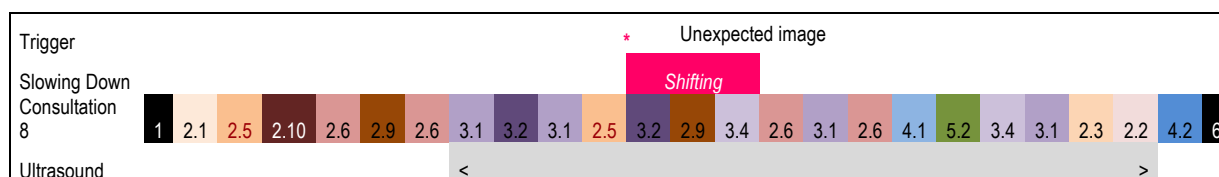


Figure 4. Flowchart of consultation eight

Figure four describes one of the *shifting* consultations that shows a short *slowing down* moment during which the radiologist asks one (or a few) question(s) to get his or her diagnosis confirmed. This question could be about the coherence with other complaints, the intensity of the pain

and possibly something about medicine use. The consultation in figure four starts with several anamnesis questions (e.g. 2.1: reason for visit; 2.5: localization). Subsequently the radiologist starts the ultrasound, explaining the patient what he or she is doing and what can be seen (codes 3.1 and 3.2). At a certain point, the radiologist mentions that a lot of colours can be seen on the ultrasound screen (code 3.2), which is the trigger for *shifting* in this case. These colours could namely indicate rheumatism, a diagnosis the radiologist had not taken into account on beforehand. He does not mention this to the patient, but the radiologist informs whether the patient has complaints related to this disease (code 2.9), by asking: “Are there any other joints that are irritating?”. A confirmation of the patient on this question also confirmed the thought of the radiologist:

“I already told you that abrasion in the thumb can be a consequence of eh, diseases, but lumps, such as these, that is quite strange. What surprised me was that I saw all those colors on the ultrasound, everywhere I looked I saw, look, I saw those colors everywhere. Many blood vessels and much too small and those are inflammatory blood vessels, which can fit very well with rheumatism. A rheumatological disease. Two new hips for someone aged 60, that is actually a bit too young.”

Figure five visualizes the short timespan of *shifting*: the radiologist starts the consultation in the automatic mode; clinical data confirms a not expected, other diagnosis and he or she makes the transition to the effortful by doubting about this other diagnosis; after this diagnosis is confirmed he or she makes the transition back to the routine and continues the consultation with that in mind.



Figure 5. Graphical representation of shifting

Checking

Another type of *slowing down* is *checking*: the radiologist consciously (double) checks additional clinical data in order to get his or her diagnosis confirmed. The trigger for *checking* is often the ultrasound image that shows an unlikely image: the gathered clinical data confirms one of the diagnoses in the differential diagnosis, however as this concerns a less likely or a rather profound diagnosis he or she conducts additional checks to be sure that he or she is right. In this data set three consultations were categorized as *checking*.

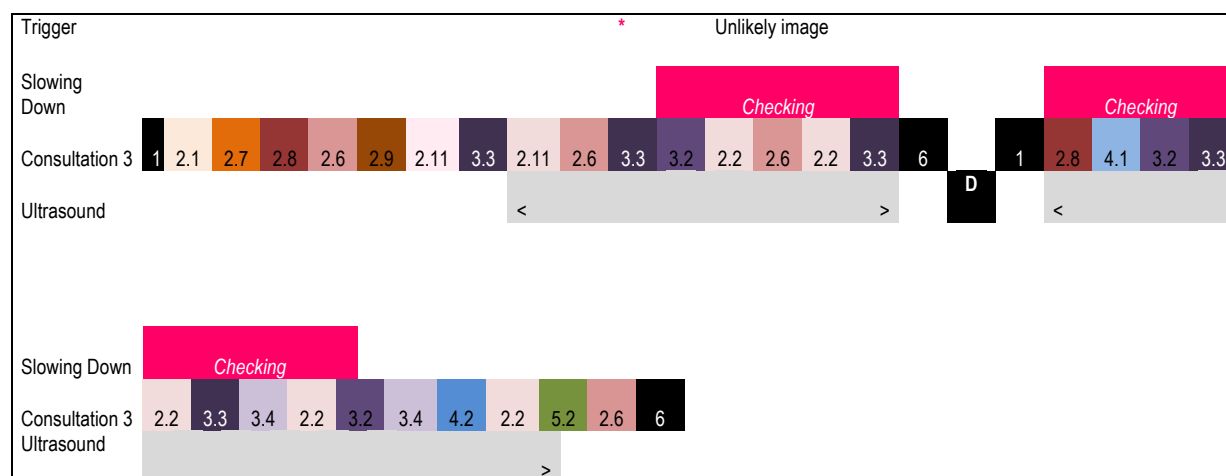


Figure 6. Flow chart of consultation 3

Figure six shows one of these *checking* consultations, that has characteristic *checking* features in it. In this case the radiologist expected to see a worn shoulder and the *checking* starts when the ultrasound shows the unlikely image that certain muscles of the patient are torn. The

radiologist had also taken this a diagnosis into account, but it was not most likely with regard to this patient. Subsequently the radiologist checks several things that can confirm this diagnosis, like the patient history (code 2.2), the intensity of the pain (code 2.6) and the cause of the complaint (code 2.8). After these points are confirmed he or she can continue the consultation with the new, confirmed, diagnosis in mind.

Notable about this type of *slowing down* is that the radiologists themselves did not describe this behaviour as a transition to the effortful, stating that they just check some points instead of really concentrating on one thing. However, these checks can be considered minor transitions to the effortful as the radiologists deliberately focus on *checking* things to be sure of the diagnosis. A conversation between a radiologist and a supervisor describes this:

- Radiologist: *"Well, it did change a bit, this wasn't the diagnosis I had in mind when I went in, however I had taken it into account and subsequently I saw it. So no, I wouldn't consider it as a switch. And then it concerns a torn muscle."*
- Supervisor: *"And at the same time this isn't really a frequent diagnosis, that the muscle is completely torn. "*
- Radiologist: *"No that is true, therefore I included a few things to check if they confirmed it. [...] Yes in this case it was of course.. the image is actually apparent immediately, but then it is still a good thing to have some affirmative points."*

Figure seven visualizes the short timespans of *checking*: the radiologist starts the consultation in the automatic mode; clinical data confirms an unlikely diagnosis; he or she makes minor transitions to the effortful at the moment he or she checks a few points that confirm this diagnosis and after these points confirm the new diagnosis the radiologist continues the consultation (in the automatic mode) with that in mind.

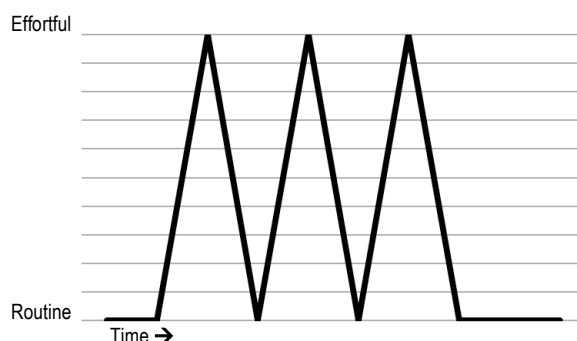


Figure 7. Graphical representation of checking

Searching

With *searching* the transition to the effortful is made because the radiologist can not explain what the reason for the complaint of the patient is, therefore he or she has to search for information to find the explanation. This type of *slowing down* is triggered by either an unknown image, which makes the radiologist searches for information that explains that image, or by not finding anything. In this data set consultation four consultations were categorized as *searching* as it was not clear what the diagnosis was and the radiologist tried to find out what it could be:

- Researcher *"So as you can't really tell what it is, you're now considering all possibilities in your head to find out?"*
- Radiologist *"Exactly, but in this case I still can't really tell what it then is."*

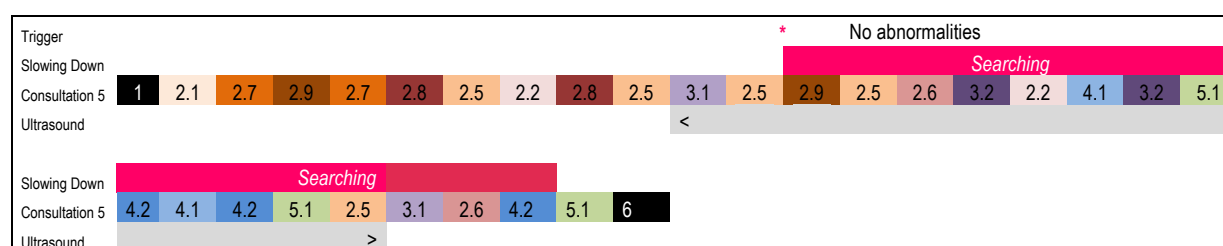


Figure 8. Flow chart of consultation five

Consultation five, shown in figure eight, concerns one of these *searching* consultations, which shows different characteristics of *searching*. First, during the physical examination the radiologist often indicates that he or she does not know what the diagnosis is (code 4.1):

“... and I see something black coming out of that joint ,a fluid with small white dots in it and that is something I don't understand. So that's something I really have to think about. Especially with regard to the story you are telling me.”

This can be accompanied with moments that the clinician draws a diagnostic conclusion (code 4.2) but then again expresses his or her doubts (code 4.1), or he or she states that to ensure this diagnosis additional research is needed (5.1). Second, this type of *slowing down* is characterized by several (anamnesis) questions asked during the physical examination, especially questions with regard to the localization (code 2.5), he or she asks the patient several times where he or she feels the pain. Third, in almost every consultation in which *searching* took place no final diagnosis could be drawn, which made that the consultation was concluded with a referral to another radiologist, a CT scan, or another type of additional research (code 5.1).

Figure nine describes this *searching* process: the radiologist starts the consultation in the automatic mode; clinical data shows either an unknown image or no abnormalities; the radiologist makes the transition to the effortful and gathers information from the patient and tries to match this with his or her own knowledge. In most cases the effortful reasoning lasted until the end of the consultation and no definite diagnosis was given. However, in some cases the puzzle pieces fitted together in the end and a diagnosis was drawn (dotted line).

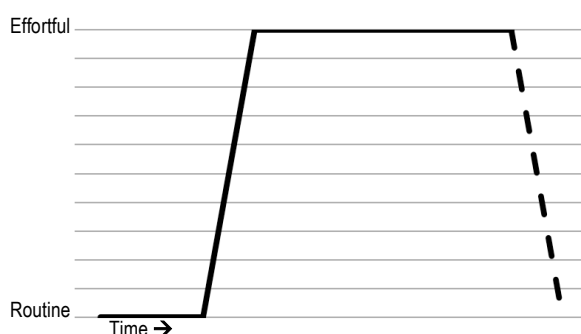


Figure 9. Graphical representation of searching

Focusing

The last type of *slowing down* is *focusing*, which concerns a technical form of *slowing down* instead of a cognitive form. Due to a blurred image or because of an image that shows not abnormalities the radiologist makes the transition to an effortful state and looks or works more focused in order to see the clinical data on the ultrasound screen clearly. In this data set three consultations were categorized as *focusing*.

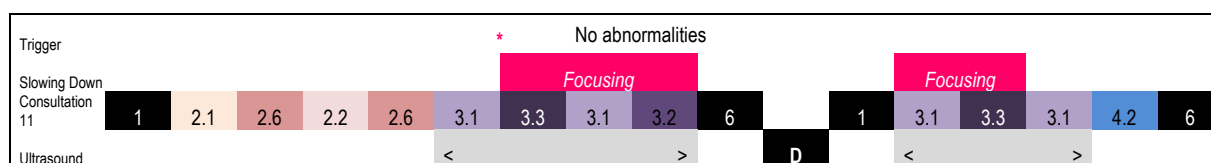


Figure 10. Flowchart of consultation eleven

The *focus* consultations were all ‘check’ consultations: (half) year appointments with patients that have had a tumour/cancer and need to be checked for metastases. Consultation eleven, which is shown in figure ten, shows one of consultations with the main characteristics of *focusing*. As it concerned ‘check’ consultations no extensive anamnesis in order to get the patient problem clear was needed. This made that, often, only a minor anamnesis preceded the physical examination, covering a remark regarding the reason for the visit, whether the patient had complaints or pain (codes 2.1 and 2.6) and what was found during previous appointments (code 2.2).

Moreover, in contrast to other forms of *slowing down* in clinical reasoning, *focusing* was not characterized by the radiologist asking anamnesis questions during the physical examination, but the majority of the consultation consists of silence and the radiologist giving instructions to the patient (codes 3.1, 3.2, 3.3). During consultation eleven the radiologist could not find previous defined lesions,

which made that she only gave instructions to the patient, while looking more *focused* at the ultrasound screen:

“Yes, then I look really thoroughly in the segment if I can see it. Also, as he now watches along I look more focused: haven’t I missed something that I could not quite get on screen?”

A unique feature of *focusing* concerns the possibility to pro-actively plan this transition to the more effortful. Prior to the consultation, the patient file can show what patient- or procedural-checkpoints can lead to *focusing*. For example, when the patient file shows that a patient has a scarred liver, which makes it difficult to see metastasis, the radiologist knows he has to *focus* when he wants to get this liver on the ultrasound screen clearly.

Figure eleven shows this *focusing* process: the radiologist starts the consultation in the automatic mode; a blurred image or the fact that the radiologist can not find something triggers a transition to the effortful mode and the radiologist looks more focused, needs to press harder with the ultrasound machine or needs to adjust his or her procedure; the radiologist stays in this effortful state until he or she finds the clinical data that is needed, or until he or she is sure that something (e.g. metastasis) is not present, where after a transition is made to the automatic.

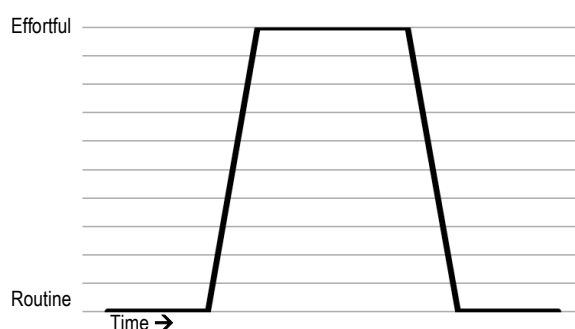


Figure 11. Graphical representation of focusing

INITIATORS AND SUBSEQUENT FORMS OF SLOWING DOWN

It appeared that certain triggers led to specific forms of *slowing down* shown by table seven. In the current study the statements of the patients were a trigger for *shifting*. Furthermore, when the radiologist did see something on the ultrasound screen, this could have different consequences: unknown images led to *searching*, an intensive form of *slowing down*, while unexpected images led to *shifting* and unlikely images to *checking*, two forms in which the radiologist made minor transitions to the effortful. Moreover, *searching* could also be initiated by the ultrasound that showed no abnormalities. That same trigger could lead to *focusing* in case the ultrasound image did not show a previous defined diagnosis (e.g. a cyst or lesion) and the radiologist would therefore look more focused if they had not missed them. This was something that would also occur in case an image was blurred.

Table 7.

Cross-tab that links the initiators (vertical bar) with the forms of slowing down (horizontal bar)

	Checking	Shifting	Searching	Focusing
Patient statement		x		
Unknown			x	
Unexpected		x		
Unlikely	x			
No abnormalities			x	x
Blurred image				x

DISCUSSION

The aim of this study was to explore how expert clinicians make the transition from the more automatic to the more effortful mode of clinical reasoning during patient contact in the polyclinic. The exploratory study focused on radiologists, on how they *slow down* during daily practice in the polyclinic. First the results will be discussed, followed by the theoretical implications, the discussion of the strengths and weaknesses of the study and the practical implications.

DISCUSSION OF RESULTS

Regarding the question 'how do expert clinicians make the transition from the more automatic to the more effortful mode of clinical reasoning during patient contact in the polyclinic' there can be concluded that, triggered by different initiators, clinicians make the transition from the more routine to the more effortful mode of clinical reasoning in different forms. By this, the results of this study confirm the statement of Schön (1983) that in the muddy zones of practice expert clinicians make the transition from the more automatic to the more effortful mode of reasoning (reflection-in-action) to effectively respond to relevant, essential, yet in some cases subtle cues. What these exact initiators for and forms of *slowing down* are is explained below.

Initiators for making the transition from the routine to the effortful mode

The results show that regarding initiators for the transition, the results are in line with the framework of Moulton et al. (2010a), as it appeared that the radiologists in some cases proactively plan *slowing down* by taking into account patient-specific and procedural-specific triggers. Moreover, other initiators that cause the transition to the effortful mode of reasoning during clinical practice are: a statement from the patient or the ultrasound image that either shows or does not show something, which leads to confusion with regard to the diagnosis.

A patient statement can initiate *slowing down* when the patient mentions something, for example regarding the cause of the complaint, which makes that the clinician doubts about his or her initial diagnosis. This is a unique initiator for *slowing down* during patient contact as in surgical practice, which is the case with Moulton et al. (2010a), patients can not talk due to the narcosis.

When the ultrasound image shows something, an initiator for the transition can either be an unknown, unexpected or unlikely image. In case of an unknown image the radiologists can not declare what it is, while in case of an unexpected image he or she can explain it, but it differs from the initial diagnosis. And although radiologists often take into account the diagnoses showed by unlikely images, these images still initiate *slowing down* as the radiologist is surprised by it.

Slowing down can also be initiated by the ultrasound image that does not show anything, something that can be a consequence of two initiators. First, a blurred image initiates *slowing down* as the radiologist has to look more focused to see everything clearly. Second, in case no abnormalities are visible on the ultrasound image a transition to the effortful mode is made when the radiologist tries to find these abnormalities or the cause.

Making the transition from the routine to the effortful mode

Four different forms of making the transition from the routine to the effortful mode of clinical reasoning were found: *focusing*, *checking*, *searching* and *shifting*. With regard to surgical practice, Moulton et al. (2010b) also found four forms of *slowing down*, namely: *stopping*, *removing distractions*, *focusing more intently* and *fine-tuning*. Comparing these different categorizations for *slowing down*, it becomes apparent that two of these proposed forms resemble, while the other two differ from each other: *focusing* and *checking* are in line with two categories proposed by Moulton et al. (2010b), while *shifting* and *searching* are new forms that were found.

Focusing concerns a form of *slowing down* characterized by silence from the side of the radiologist, as he or she has to focus on the image in order to see it clear or to find what he or she is looking for. This resembles the category *focusing more intently*, as a form of *slowing down* during surgical practice, that is described as a state in which "the surgeon withdraws from extraneous conversation or distraction but proceeds without removing or controlling the environmental distractions" (Moulton et al., 2010b, p. 1574). Regarding surgical practice withdrawal from conversations and distractions concerns the additional staff during the operation, while in clinical practice this concerns the patient and context.

In contrast to withdrawal from distractions and being silent, additional questions are asked when *checking* is initiated: the radiologist consciously asks a few anamnesis questions to check certain points and get his or her diagnosis confirmed. In this, *checking* is in line with a state of *slowing*

down in surgical practice that's called *fine-tuning*: making minor transitions to the effortful state as a response to subtle cues (Moulton et al., 2010b). In both forms the clinician makes minor transitions to the effortful mode, however with regard to clinical practice this does not concern momentarily pauses, but momentarily asking questions to check if the diagnosis is correct.

Searching during clinical practice and *stopping* during surgical practice do not resemble as forms of *slowing down*, as during clinical practice a clinician can not just stop with working and a surgeon often does not need to search for a reason for the complaint. However, they do resemble in regard to the trigger that initiates the transition. In both cases the radiologist or surgeon encounters something unknown and needs more information to explain it, which in surgical practice is handled by *stopping* the operative procedure. During clinical practice the radiologist handles this by *searching* for an explanation for the unknown clinical data by asking anamnesis questions and advising additional research.

Last, *shifting* and *searching* are forms of *slowing down* that were not described before and do not resemble any of the proposed categories of Moulton et al. (2010b). Something that is not surprising as these forms of making the transition to the effortful mode are concerned with drawing the diagnosis. In *shifting* the clinician sees an unexpected ultrasound image, which makes that he or she shortly *slows down* and switches to a different diagnosis, while *searching* concerns a long transition to the effortful as the clinician does not know what the diagnosis is. Because surgical practice is more concerned with the intervention, surgeons often do not have to draw a diagnosis or search for a cause of a complaint. Instead they, for example, have to remove the cause of a diagnosed complaint.

THEORETICAL IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

After many studies theoretically examining the transition from the more routine to the more effortful mode of clinical reasoning, occasionally described in other terms (Kahneman, 2011; Normand & Eva, 2010; Schön, 1983; Hatano and Inagaki, 1986; Moulton et al., 2007; Moulton et al., 2010a), this study finally explored the *slowing down* phenomenon with regard to clinical reasoning during patient contact in the polyclinic. By these means this study has several theoretical implications. First, it has shown that, although clinical reasoning is a cognitive process, *slowing down* during this process can be observed. In addition to that, there is proven that the phenomenon can be measured with clinicians who have patient contact in the polyclinic. Moulton et al. (2010b) already showed it was measurable with surgeons while conducting surgery, with *slowing down* being explicitly observable when the surgeon removes distractions by asking their staff to stop talking, or when he or she would stop the procedure to reassess the situation. However, making the transition during diagnosing considers a much more implicit manner of *slowing down*, as a clinician cannot ask the patient to stop talking or to pause the consultation for a minute. Although this *slowing down* in clinical reasoning during patient contact occurs more implicitly, it could be measured. This has resulted in an overview of different initiators for and forms of making the transition to the more effortful mode of clinical reasoning. With this, the critique that reflection-in-action is not described in terms of what it actually looks like (Eraut, 1995), is obviated for clinical reasoning during patient contact, as the different categories of *slowing down* describe this.

With regard to the initiators for *slowing down*, the results suggested that specific initiators led to particular forms *slowing down*, for example an unexpected image initiated *shifting* and an unlikely image initiated *checking*. By reason of the small sample of thirteen cases in this research no conclusions regarding causality can be drawn, however this is an interesting point for future research. Linking it with recent work of Durning et al. (2012), who mention that different people can have a similar, yet somewhat differing, interpretation of the same clinical event, it would be interesting to study how different people intercept (different) possible initiators and how they subsequently interpret them. Moreover, there could be tested if there is a causal link between certain initiators and forms of *slowing down*. Future research could focus on this, studying if the same case, with all clinicians, leads to the same type of slowing down, or if this can differ (e.g. one clinician shifts in case he finds something he knows but did not expect, while the other checks it in order to be sure). In addition to that, also failing to slow down can be taken into account, discussing why a certain trigger makes one *slow down*, while the other does not.

Continuing on differences between clinicians, the participating radiologists in this research differed in the stage in their career. One of the participants was a certified radiologist and four residents were in different stages of their medical specialization. Although having more experience does not necessarily mean that someone has more expertise, accumulated experience is an important part of it (Hatano and Inagaki, 1986). Therefore the influence of differences in career stages on *slowing down* concerns an interesting point for future research. It could focus on if these differences in career stages and experience are associated with what forms of *slowing down* merely take place. For example, compared to (more) experienced experts, *searching* as a consequence of an unknown

image could occur more frequently with less experienced experts, as they know less clinical images. Moreover, future research could focus on how many *slowing down* moments take place at the beginning of the career of a clinician and whether this diminishes over the years, for example because a clinician develops more (sophisticated) illness scripts.

Another point of interest can be the role of meta-cognition in this process. Metacognition refers to someone's awareness regarding his or her own cognitive processes (Gordon & Braun, 1985), and allows him or her to monitor data collection, clinical performance and clinical reasoning, while also taking into account knowledge limitations that include cultural and societal values and beliefs that underpin practice (Higgs, 2008). During *slowing down* in the form of *checking*, most clinicians indicated that they were not *slowing down*, however they did consciously check certain things and often indicated that in such cases it was nice that the supervisor double-checked their findings. These results suggest that expert may not always know that they make the transition, while they do it. A direction for future research could therefore be the influence of the degree of consciousness on *slowing down*. To find out whether *slowing down* is really conscious and intentional, and what the role of metacognition is. Moreover, in relation to the initiators of *slowing down*, it would also be interesting to get clear whether these are processed consciously or if a degree of automatic processing possible. Overall, this could provide insights into the role of metacognition and consciousness in making the transition to the effortful mode of reasoning.

METHODOLOGICAL STRENGTHS AND WEAKNESSES

As clinical reasoning can only be revealed in action (Durning et al., 2011) it was a methodological strength that this study was conducted while radiologists were enacting their daily job. By doing this, they could directly reflect on their actions during consultations (reflection-on-action), describing if they made the transition (reflection-in-action), why they did and how. Shadowing a participant can affect his or her behaviour (Vásquez, Brummans, and Groleau, 2012), however during the consultation the radiologists were mainly focused on the patient so it is not expected that this had a great impact on the results.

Moreover, having residents as participants was beneficial for this study, as they still need to discuss their findings with their supervisors. During this discussion, which was observed and recorded, all the thoughts of the resident were verbalized, including statements about the degree to which he or she was certain about things. Observations, certainties, doubts, considerations and more were described during these moments. In this, the supervisor would also verbalize his or her thoughts and would (often) assist at the continuation at the consultation, which made that his or her considerations were also included. Hence, a strength of this study concerned the possibility of unobtrusive observation during the discussion with the supervisor.

Besides these mentioned upsides of the qualitative research design, some limitations are worth noting. First, contrary to quantitative data, this qualitative data can be more biased by the interpretation of the researcher. To overcome this bias and ensure objectivity the inter-rater agreement of the codebooks was calculated, resulting in a Cohen's Kappa of .77 or higher, pursued the trustworthiness of the results. Moreover, the *slowing down* consultations were categorized by a second coder, resulting in two cases in a deviating category (Cohen's Kappa of .80). After re-categorizing one case and rewriting the other, there was inter-rater agreement for all cases.

Another possible weakness of the study could be that the researcher did not had a medical background and hence was no expert on radiology. This could make that she was not able to detect some of the subtle nuances of the transition and understand them. On the other hand, in case the researcher was an expert the familiarity issue could influence the data: the researcher does not notice practices and events as she is familiar with them (Hanson, 1994). Therefore, assuming that the researcher was an expert on *slowing down* and able to get clinicians to verbalize their thoughts, this could also be considered a strength of the study as the researcher could fully focus on the process without getting caught in the content.

Last, although 41 consultations have been attended, in only 14 of them the *slowing down* phenomenon took place, resulting in a rather small sample size. Sandelowski (1995) argues that it is of importance that there is ensured that the sample size is large enough in order to provide a rich understand of experience, but also manageable (small enough), which is a matter of subjective judgement according to him. In addition to that, following an empirical approach, Guest, Bunce, & Johnson (2006) used 60 interview and found that saturation occurred after 12 interviews. Despite, this possible limitation of the sample size, a rich description is given regarding the *slowing down* phenomenon that with regard to external validity has generated results that can be generalized to clinical reasoning in other specializations that collect (clinical) data in-action (e.g. gynaecology).

PRACTICAL IMPLICATIONS

It appeared that there are several initiators that lead to a transition to the effortful mode of clinical reasoning. These findings have implications for teaching both proactively planned and situationally responsive *slowing down*.

Proactively planning slowing down

Greenwood (1993) mentioned the absence of reflection-before-action as a flaw in the model of Schön (1983), as people will then include thinking through what action to perform and how to do it, which might reduce error. In the model of Moulton et al. (2010a) this reflection-before-action is incorporated in the form of proactively planned *slowing down*. By including this subject during lessons or by letting students proactively plan a consultation during their internships they can learn it. This would serve a dual purpose: on the one hand students become aware of the significance of *slowing down*, on the other hand they directly learn how they can prepare themselves for it (reflection-before-action), which will make them prepared for critical moments during which a transition to the effortful is needed. By including both the procedural- and the patient-specific *slowing down* moments they will become competent in detecting the critical moments of the procedure and the specific patient. They should then be able to verbalize, taking the particular features of the patient (e.g. history of illnesses) and procedure into account, what triggers will initiate *slowing down*.

Taking the drawn categories in mind, this proactively planned *slowing down* can influence different categories. Planning could help with *focusing*, as when a clinician has already taken in mind that the ultrasound screen could show a blurred image or that something could be difficult to see, he will directly *focus* when looking for a particular thing. Moreover, *checking* can be preplanned *slowing down* when the clinician values the 'lower order' diagnoses and knows that he or she has to check certain things when the clinical data suggests that it is one of these diagnoses. As *shifting* is triggered by the ultrasound image that shows an unexpected diagnosis, this type of *slowing down* will be more difficult to plan. However, by preplanning in the form of thinking about the possible triggers and taking many diagnoses into account with regard to a specific patient case, it could be that *shifting* is not needed, as the diagnosis is not unexpected anymore. Last, *slowing down* in the form of *searching* will be hard to preplan as this is triggered by finding something that the clinician is not familiar with.

Learning situationally responsive slowing down

This study showed that *slowing down* is revealed in action and that the context provides the initiators for it. As the initiators for and forms of *slowing down* are influenced by the context it is of importance that this context is also included when teaching situationally responsive *slowing down*. In order to become an expert in clinical reasoning and make the transition to the effortful when needed, trainees should be able to recognize cues that lead to the transition and know what the thought processes of a clinician are during these moments. This can be addressed during internships, when trainees accompany a senior clinician during daily practice. Just like the design of this study the clinician can indicate to the trainees, when possible, when such a transition takes place. Subsequently, after the consultation, reflection-in-action can be applied when the clinician verbalizes what initiated the *slowing down*, what he or she thought at that moment and why he or she reacted in the way he or she did. By doing this the clinician takes the trainees with him or her in the reasoning process, describing how an expert clinician thinks.

CONCLUSION

In literature there is stated that, to prevent diagnostic error and ensure patient safety, making the transition from a more routine to a more effortful mode of clinical reasoning, when needed, is crucial. To see if this theory also applies in practice, the current research successfully explored this so-called *slowing down* phenomenon among clinicians who have patient contact in the policlinic. By linking the thoughts of the participating clinicians to their actions during clinical practice the research at hand provided results that have three major theoretical implications. First, making the transition from a more routine to a more effortful mode of reasoning, when diagnosing patients, is something that can be observed. Second, it can be measured. Third, this measurement has shown that different initiators trigger different forms of *slowing down*, namely: *shifting*, *checking*, *searching and focusing*. Hence, these findings are in line with theories that propose an interaction between a routine and an effortful mode of (clinical) reasoning. Moreover, the results reveal that making the transition to a more effortful mode of clinical reasoning is not something that only exists in these theories in research articles, but *slowing down* actually takes place during clinical practice: to arrive at the right diagnosis, without causing accidents in the form of diagnostic errors and patient harm, clinicians change gear when needed.

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APPENDICES

APPENDIX A – DIFFERENTIAL DIAGNOSIS

The differential diagnosis

Prior to the start of a consultation clinicians often draw a differential diagnosis, the process that is described in figure 1. They start with drawing a list of diagnoses that can suit the particular complaint of the patient (Step I). Thereafter they try to make a logical sequence in the list of diagnosis: which one is most and which is less likely to be the right diagnosis (Step II), this is the so-called differential diagnosis. Last, step III takes place during the consultation. Then clinical data will be gathered and on the basis of this data, that can confirm or contradict the diagnoses, a selection of right diagnoses or *the* right diagnosis can be made (Grundmeijer, Reenders and Rutten, 2004).

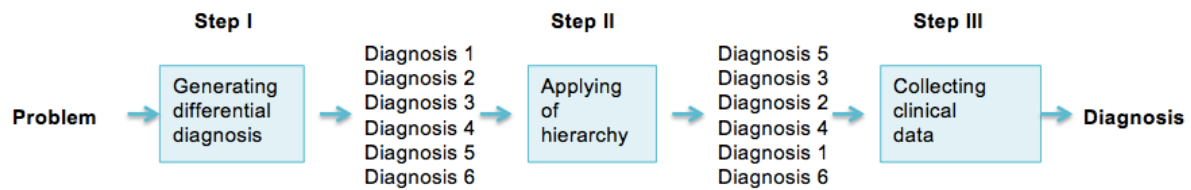


Figure 12. Scheme describing the construction of a (differential) diagnosis (Grundmeijer, Reenders and Rutten, 2004)

APPENDIX B – PHASES OF CONSULTATION

Phases of medical consulting (Veening, Gans and Kuks, 2009)	
Acquaintance contact.	& Phase during which the radiologist and patient have the first contact.
Anamnesis	Phase during which the patient explains the reason for his/her visit and the radiologist tries to obtain the (medical) history and/or relevant information of the patient for formulating the diagnosis and providing medical care to the particular patient.
Physical examination	Phase during which the radiologist conducts the physical examination by making the ultrasound. This includes instructions for the patient and verbalizations of actions.
Diagnose	Phase during which the radiologist draws (hypothetical) diagnostic conclusions, he/she knows, thinks he/she knows or indicates that he/she does not know what the diagnosis is.
Intervention	Phase during which the radiologist discusses the possible interventions for either treating the diagnosed condition or additional research that should be done to come to accurate diagnose.
Completion	Phase during which the radiologist discusses the following steps he/she will take or that the patient should take, says goodbye and reports the consultation.

APPENDIX C – CONSULTATION CODEBOOK

Code	Nr	Definition
Acquaintance & contact		
	1	The patient and radiologist greet each other; the radiologist asks what the date of birth of the patient is.
Anamnesis		
Reason	2.1	The radiologist and patient discuss the reason for the visit: What is the reason for the visit? What is the complaint of the patient? Is it pain? Or something else? When it concerns pain, what kind of pain? Stabbing, aching, burning or cramping?
History	2.2	The radiologist and patient discuss the medical history of the patient: What were previous complaints, illnesses, treatments, surgeries etc. of this patient? What was the experience of these interventions?
Medicine use	2.3	The radiologist asks something about the use of medicines; the patient mentions something about the use of medicines.
Other radiologist	2.4	The radiologist asks something about other clinician that the patient is seeing; the patient mentions something about another clinician.
Localisation	2.5	The radiologist and patient discuss where the complaint is located: Where is it exactly? Possibly the patient can designate or define it. Are there also complaints at other places? Does the pain/complaint radiate to other places, if so, where to then? And how often?
Intensity	2.6	The radiologist and patient discuss the intensity of the complaint: How severe is the complaint? Does the complaint affect everyday life (home, work, sleep, etc.)? Does the patient avoid certain thing that he/she usually did do? Does it affect surrounding people? Patient mentions that something hurts.
Chronology	2.7	The radiologist and patient discuss the timeframe of the complaint: For how long has the patient had this complaint (hours to months)? When did it start? Did it start gradually or acute? Does it concern attacks or is it more continuously? Does it increase or does it remain more or less the same?
Cause	2.8	The radiologist and patient discuss the cause of the complaint: How did the situation arise? Was there any clear reason? What could be a possible explanation in retrospect? Did it arise acute or insidious? What could be the explanation emergence of this complaint
Coherence	2.9	What are accompanying symptoms (fever, pain, nausea, itching, etc.)? Are the complaints related to the heart, with a particular posture, the time of day, etc.? What aggravates or reduces the complaint? Is there a connection between the complaint and work, home, sport, hobbies, daily activities, food or travel? Are any family members familiar with the complaint?
Conception and perception	2.10	What are the own ideas and experiences of the patient? Is the complaint similar to a previous complaint? What are the wishes of the patient?
Other	2.11	The radiologist and patient discuss other things: As the radiologist is still in training he/she will discuss the images with his/her supervisor; personal stories; informal stories.

Code	Nr	Definition
Physical examination		
Description	3.1	The radiologist describes what he/she does, sees and feels / the patient wants to know what the radiologist does, sees and feels: What is he/she going to do? What is going on? Facts. What does he/she see? What does he/she feel?
Explanation	3.2	The radiologist explains what his/her interpretation of the visual data or physical examination is / The patient asks what the interpretation of the radiologist regarding the data and/or their complaints: What is this clinical data? Why does the radiologist do this? What does this mean?
Instructions	3.3	The radiologist gives the patient instructions for making the physical examination possible / the patient asks something about the instructions of the radiologist regarding the instructions: In what position should the patient sit or lie down? Should he or she hold his/her breath?
Other	3.4	The radiologist and patient discuss other things: As the radiologist is still in training he/she will discuss the images with his/her supervisor; personal stories; informal stories.
Diagnosis		
Hypothesis	4.1	The radiologist makes statements about possible diagnosis or doubts: It could be that this is caused by X; I don't understand why I see this fluid over here; It could either be X or Y.
Final	4.2	The radiologist draws his/her diagnostic conclusion: What is the diagnosis; what causes it; <i>when something (a certain disease/complaint) needed to be excluded</i> : he/she did find something or he or she did not find something.
Other	4.3	The radiologist and patient discuss other things: As the radiologist is still in training he/she will discuss the images with his/her supervisor; personal stories; informal stories.
Intervention		
Additional research	5.1	The radiologist tells or asks something about additional research / the patient tells or asks something about additional research: What previous additional research is already done? What additional research is advised or needed? Radiologist tells why this additional research is done.
Treatment	5.2	The radiologist tells something about the treatment of the complaint of the patient / the patient asks something about the treatment of his/her complaint: What treatment is advised? What should the patient do?
Other	5.3	The radiologist and patient discuss other things: As the radiologist is still in training he/she will discuss the images with his/her supervisor; personal stories; informal stories.
Conclusion		
	6	The radiologist discusses the following steps he/she will take or that the patient should take, says goodbye and reports the consultation. The radiologist leaves for a moment.

APPENDIX D – PRE- AND POST INTERVIEW CODEBOOKS

Pre-interview codebook

Code	Nr	Definition
Application		
Complaint	7.1	Radiologist describes that the reason for the visit concerns a complaint.
Check	7.2	Radiologist describes that reason for the visit concerns a check (e.g. a follow-up appointment to check for metastasis)
Differential diagnosis		
Hypothesis	8.1	Radiologist gives overview of diseases that could be the cause of the complaint; How sure is he/she about this? Which (patient) features he or she expects to find? What certain organs will look like?; What the patient will look like or do in daily life?
Judgement	8.2	In addition to the diagnosis the radiologist adds a judgement or a statement about what he or she would think of that.
Initiators		
Patient specific - file	9.1	The radiologist describes what he or she already knows about the patient, based on his or her patient file (previous research etc.)
Patient specific - person	9.2	Radiologist explains what or what he or she will ask the patient. He or she explains how he/she will handle the anamnesis.
Procedural specific	9.3	Radiologist explains what he or she will do, with regard to making the ultrasound. He or she explains how he or she will conduct the physical examination

Post interview codebook

Code	Nr	Definition
Application		
Complaint	10.1	Radiologist describes that the reason for the visit concerns a complaint.
Check	10.2	Radiologist describes that reason for the visit concerns a check (e.g. a follow-up appointment to check for metastasis)
Differential diagnosis		
Hypothesis	11.1	The radiologist describes which different diseases he or she would find likely based on what he or she has seen;
Final	11.2	The radiologist draws the diagnostic conclusion: what the diagnosis is; what causes it.
Initiators		
Patient specific - file	12.1	The radiologist describes what he or she already knows about the patient, based on his or her patient file (previous research etc.)
Patient specific - person	12.2	The radiologist refers to statements or comments the patient made during the consultation, in other words the data he or she got from the patient based on the conversation.
Procedural specific	12.3	The radiologist explains the ultrasound images that are made, what can be seen on it.
Slowing down		
Positive	13.1	The radiologists states that he or she had to 'slow down', for example in terms of working more concentrated
Negative	13.2	The radiologist states he or she did not need to work more concentrated.

APPENDIX E – SUMMARIES

CONSULTATION 1

Patient Man, 35

Application Complaint:
“Dit is een meneer die last van de pols heeft en de huisarts geeft aan dat hij graag wil weten of het een ganglion is.”

Expectation: *“Een ganglion is zeker te verwachten, artrose achtige verschijnselen, maar het kan ook iets reumatische klachten zijn. Dit een beetje wat ik verwacht, maar vaak het eerste beeld laat direct zien welke kant ik op moet denken.”*

Consultation *“Dit is zeker geen ganglion, de man is bekend met jicht. [...] Nou als je dit ziet op de echo, dan moet je er van op aan van eh op zich als je dit ziet dan weet je direct dat het geen ganglion.”*

Slowing down *“Omdat hij ook al direct zei dat hij jicht heeft, dan weet je op zich wel zeker en je weet ook wel bijna zeker dat het iets samenhangt met, iets jichtachtigs moet zijn want anders krijg je niet zo'n brok weke delen er omheen. [...] vervolgens ging ik met jicht verder en zette ik het onderzoek voort.”*

CONSULTATION 2

Patient Woman, 72

Application Check
“En nu een vrouw met leverfibrose, het gaat dan om te kijken of dit geen cirrose is of wordt want dat kan voor forse complicaties zorgen. En dit is een controle omdat er in het bloed de leverwaarden wat verhoogd zijn.”

Expectation: *“Dat kan van alles betekenen dat de eh, dat je helemaal niets ziet aan de lever, dat eh je kan zien dat er iets afwijkends is aan de galblaas of aan de galwegen of dat de lever dat het parenchym helemaal veranderd is dat het verlittekend is of juist vervet dus eigenlijk van alles.”*

Consultation *“Ik wist dus al dat hij een beetje verlittekend is en dat zie ik nu ook weer, dat is eigenlijk direct het eerste beeld wat je er van ziet is al echt een stompe leverpunt en ook helemaal hobbelig, wat je krijgt doordat die lever ineem krimpt [...] Maar ja ik kan over de rest van het leverparachiem, durf ik niet zo veel te zeggen. Het is zo verlittekend dat je het met de echo gewoon echt niet zo mooi kan beoordelen.”*

Slowing down *“En was hier dan geconcentreerder werken nodig?": "Jazeker, doordat mevrouw dan al in de rolstoel zit een beetje, maar vooral omdat die lever verlittekend is moest ik dus harder drukken uiteindelijk en viel daarmee uiteindelijk wel duidelijk te zien dat de lever niet of vrij weinig veranderd is en er dus geen opmerkelijke dingen zijn. [...] Eh dan is het vooral de techniek waar je mee bezig bent, dus dat is meer van oké ja hoe komt het dan dat hij niet goed in beeld komt is dat puur door die verlittekening of kan ik toch iets meer zien”*

CONSULTATION 3

Patient Man, 50

Application Complaint
“..er staat sinds zwaaibeweging last van abductieprobleem”

Expectation: *“.. Kijk als mensen dus een abductie maken, hier zit die pees en die gaat dan, die kruipt dan hier onderdoor en deze botstructuur die maakt hem daar wat nauwer en daar is dus een grote kans dat er dus eh irritatie ontstaat waarbij het de vraag is of er echt iets gescheurd is of niet.”*

Consultation *“Nou hij vertelde direct dat het wel op een bepaald moment is geweest en dan zou het natuurlijk nog steeds slijtage of iets kunnen zijn, maar het lijkt er hier op dat het gescheurd is. [...] Precies ja en dat door zo'n simpele zwaaibeweging. Dan zit er misschien een klein beetje vocht in de schouder en wat ik zo zie zitten er zeker wel wat verkalkingen in de insertie het is ook een beetje verdikt. Maar hieronder daar zit de [bepaalde spier] en die is weg, hier heb ik niks.”*

Slowing down *“Nou het veranderde iets, dit was niet waarmee ik erin ging, maar wel iets wat ik meenam en vervolgens zag je het ja. Dus nee geen switch. En vervolgens is het dus de gescheurde spier. [...]Nee dat is waar, dus daarna pak je nog wel een paar zaken erbij van ja kan ik die erbij rijmen.”*

CONSULTATION 4

Patient Woman, 56

Application Check
“Dit is weer een follow-up, Follow up: Weer met de voorgeschiedenis van HCV, hepatitis C virus en alcohol en daarbij een verlittekende lever dus dan willen ze zeker weten dat daar niet een tumor ontstaat”

Expectation: *“Die weer wat, een klein beetje verlittekend kan zijn, dus wat echorijk, wat hobbelige levercontouren eh en als dat verder doorgaat dan kan je hebben dat het eh, dat de flow in de vena porta omkeert dus dat hij juist van de lever weggaat in plaats van er naartoe. Omdat de lever te verlittekend wordt. Eh je kan krijgen dat je milt vergroot wordt door dat de druk te hoog wordt in de lever, je kan hebben dat er vrij vocht ontstaat in de buik doordat eigenlijk de afvoer van afvalstoffen naar de lever niet meer goed gaat. Eh ja dus dat een beetje, of er nier ergens een vocale afwijking ontstaat. En deze patiënt heeft dus al een galsteen. Ja. Je zou hem hier dan moeten zien.”*

Consultation *“En dan zie ik in dit gebiedje en dat vind ik wel eh ja dat kan twee dingen zijn dat kan dus een nieuwe tumor zijn of het kan een gebied zijn waar wat minder vervetting is. [...] Ja een HCC, een tumor, maligna. Dus als daar niks aan gebeurd dan gaat dat gewoon verder groeien, uitzaaien.”*

Slowing down *“Ja dat is juist waar je ook naar kijkt. En dan is het nog steeds wel een soort van spannend dat je het ontdekt, maar niet dat je het niet verwacht. Hier wordt dus verder onderzoek nog naar gedaan door middel van die MRI en dan gaan ze kijken hoe het behandeld kan worden. [...]Hmm ik weet niet of ik het direct als een meer geconcentreerdere manier van werken zou zien, maar je kijkt wel zeker beter en een keer extra of het ook echt klopt. En het is dan toch fijn als de supervisor het ook even checkt.”*

CONSULTATION 5

Patient Man, 70

Application Complaint
“Man, spierziekte, heeft laatste erg veel pijn in de heup en dat trekt ook in de benen naar beneden, maar het is begonnen in de heup. Last van met staan en vooral met liggen. Geen controle meer over spieren, daardoor vallen benen naar buiten en soms bij liggen last van trekkend gevoel in knie en dat het naar beneden trekt.”

Expectation: -

Consultation *“Ik zie niks, het ziet er normaal uit. Dat is natuurlijk heel vervelend, want het liefste zou ik natuurlijk wat zien. Maar ja ik moet er dus gewoon wat meer over nadenken en we komen er hier dus nog niet goed genoeg mee uit. Dat is dus de boodschap. Ik denk dus, ik zou adviseren aan de mensen van de revalidatie doe een CT scan, dan kunnen we dit vergelijken met de vorige CT scan en dan kijken we daarmee naar het punt en dan eh kunnen we nadenken. Van wel of niet komt er een volgend scenario, maar daar kan ik natuurlijk nog helemaal niets over zeggen”*

Slowing down *“I'm not particularly expert limb-girdle disease because it is a very very rare disease I have to I'm going let's I will look if I can find from literature something, this afternoon, to be sure, because we don't have enough knowledge to be sure we can advise something that's valuable. Because normally in clinical reasoning I'm trained with loads of different diagnosis and to check, I'm not completely sure that I can trust myself in the things I know and that's why I need to look up for extra findings. Yes? I think that's it.”*

CONSULTATION 6

Patient Woman, 45

Application Check
“Mevrouw is hemodialyse patiënt, en ze willen een infectie.. Nou het is blijkbaar is ze eh, ja kijk ik weet niet precies waarom ze nu denken aan, volgens mij een jaarcontrole. Ja, maar ik weet ook niet waarom dat nou specifiek is, want deze patiënt er staat eigenlijk niet echt iets bij waarvan je denk dat zou je jaarlijks moeten

controleren maar goed. Maar het gaat vooral om of er geen afwijkingen zijn in de buik."

Expectation: -

Consultation *"Zoiets is natuurlijk niet de meest makkelijke echo. Ja, ik kan hier dan eigenlijk vrij weinig mee, startend met dat die lijn daar midden op zit en ik daar omheen moet."*

Slowing down *"Ja precies dat wel, maar geen cognitieve slowing down. [...]Ja. Meer van ze heeft dus die dialyselijns waardoor ik anders te werk moet gaan, daarnaast werkt ze helemaal niet mee, ook met inademen, de ademcommando's ja ze reageerde er helemaal niet op. En ze had daarbij haar postuur voor een echo ook niet echt mee. Dus dat maakt dan wel dat je geconcentreerder moet handelen om dingen te zien."*

CONSULTATION 7

Patient Woman, 46

Application Complaint
"Eh Hb daling, verdenking bloeding. Het gaat om een plek ter hoogte van een eerder incisie als kind in verband met abces. Hmm rechts. Kijken of er eerder iets is geweest, iets met echo abdomen. En de vraag vanuit de andere arts is of het om een abces of hematoom gaat."

Expectation: *"Ik denk dat in eerste instantie dan zit daar inderdaad iets van bloed of een abces, maar ja een abces verklaart niet een Hb daling. Dus je denkt in eerste instantie aan iets van een bloeding. Maar ja, raar. Nou ja we gaan kijken. We gaan eerst maar even kijken waar het zit en dan gaan we het zien."*

Consultation *"There is somekind of collection still underneath the skin. But with ultrafound we can not see what kind of fluid, if it is blood or if it is an abces or, that is really difficult to say. [...] maar ik kan hier dus nog niet echt zeggen wat het is. Weet je wat het is als het puur en alleen een abces was dan gaat dat vanzelf wel weg, of je prikt erin en het loopt leeg. Maar als er wel bloed naartoe stroom want dan blijft het stromen. Dus dat weet ik niet. En het kan ook nog dat het een soort van los ligt zeg maar, je ziet hier dat het defect ook iets omhoog ligt, van vroeger."*

Slowing down *"Dus je kan eigenlijk niet zeggen wat het is en bent nu in je hoofd meerdere dingen langs aan het gaan om er zo wel achter te komen?"
"Precies, maar ik kan hier dus nog niet echt zeggen wat het dan wel is, ik loop van alles langs in mijn hoofd, maar kan het nog niet plaatsen."*

CONSULTATION 8

Patient Woman, 70

Application Complaint
"Slijtage bij de duim en krijgt nu allemaal knobbeltjes."

Expectation: *"Slijtage in de duim kan heel goed komen door het eh leeftijd, maar ook ziektes. Veel mensen hebben natuurlijk last van slijtage als ze ouder worden en het kan ook komen door ziektes, maar ik zie verder geen ziektes bij haar staan, maar als die bobbeltjes dat is best een beetje gek."*

Consultation *"Overall kwam ik weer van die kleurtjes tegen, veel bloedvaten en veel te klein en dat zijn ontstekingsbloedvaten, die heel goed bij reuma kunnen passen. Reumatologische ziekte. Twee nieuwe heupen voor iemand van 60, dat is eigenlijk een beetje te jong."*

Slowing down *"Ja ik zag het vrij snel, dat het reuma was. Dus dan zit je ook een beetje te denken, hé die heupen zijn er dan wel ingegaan, maar was dit onderliggen lijden ook al niet een ziekte van de gewrichten eh.. dezelfde ziekte die dit kan veroorzaken. Nou als ik het zo van haar hoor is er nog nooit iemand die daar die link heeft gelegd en dan zit ik toch in een dilemma, moet ik haar nu hier vertellen dat ik daar aan denk. Maar met die diagnose, daar ging ik dan mee verder en vroeg ik verder uit om erachter te komen of mevrouw flexibel genoeg was om het van mij te horen."*

CONSULTATION 9

Patient Woman, 52

Application Complaint
"Mevrouw heeft pijn, zwelling, misschien een ganglion, kan het niet buigen en strekken, radiaal de strekpees."

Expectation: *"..Nou dat is vaag, we gaan het zien."*

Consultation *"Nou dit is ook dit gewricht wat je kunt bewegen en dan zie ik dat er uit het gewricht komt iets zwarts, dat is vocht en daar zitten kleine witte puntjes in en dat snap ik niet. Dus daar moet ik nog even heel goed over nadenken. Zeker met het verhaal dat u vertelt."*

Slowing down *"Eh ja dit is iets waarvan ik, iets wat niet past, wat niet in het kader van klinisch redeneren te beredeneren valt. Dit is iets wat eh, wat onverwacht is en niet zomaar een eh een standaard ziekte is."*

CONSULTATION 10

Patient Woman, 46

Application Check
"Wederom een controle van de lever, nadat een tumor in de dikke darm is verwijderd"

Expectation: *"We gaan zien of we iets kunnen vinden of dat het er goed uitziet."*

Consultation *"maar op de CT was ook daar wel een klein dingetje aan de linkerkant, die ligt wat meer aan de rand en dat ligt ook lager dus dat is niet hetzelfde dat wilde ik nog even controleren. Anders in de lever zag ik geen dingen en die cyste zag ik ook niet terug. Wel mooie echogeniciteit van de lever, lage flow maar.. De galblaas is smalwandig. Verder ziet alles er goed uit, maar dus wel dat ene plekje waarvan ik denk dat zou eventueel wel een metastase kunnen zijn."*

Slowing down *"Nee, nee niet perse eigenlijk, omdat dit ook gewoon iets is wat je kan vinden had ik dit al wel in gedachten. Dus niet dat ik dan opeens denk van oh nou moet ik even dingen anders bekijken. Maar je hebt dan wel liever dat je supervisor het nog een keer goed checkt omdat je wel zeker wil zijn dat je het goed hebt gezien."*

CONSULTATION 11

Patient Woman, 52

Application Check
"Nu komt er een patiënt die een darmtumor gehad heeft, deze is verwijderd maar dan moet de patiënt wel voor controle blijven komen. Dan checken we de lever."

Expectation: *"Ik ben nu specifiek naar die aantal leasies aan het kijken, maar ook naar zie ik iets nieuws, zie ik iets veranderd. Dan met name vrij vocht en vocale afwijkingen"*

Consultation *"Eerder waren er wel twee leasies gezien in segment 4 en 4D en een cyste in segment 7. Ik zag het allemaal niet. Die zijn eerder geduid als benigne."*

Slowing down *"Ja, dan ga je echt even helemaal goed in dat segment kijk van zie ik het niet. Ook zoals nu hij meekijkt dat kijk je wel gerichter. Heb ik niet net iets gemist wat ik net niet helemaal in beeld kreeg. Maar ik zie niet ook niet die cyste. Tenzij die hele kleine, maar lijkt me niet. Dat is ook gewoon frustrerend als je het niet ziet. [...]Ja, ja dat denk ik toch wel. Maar dan niet zo zeer met betrekking tot klinisch redeneren over wat het is, maar dat je handelingstechnisch even een stapje terug moet doen en geconcentreerder moet kijken."*

CONSULTATION 12

Patient Woman, 57

Application Complaint
"Mevrouw heeft buikpijn of pijscheuten in de bovenbuik en heeft het idee dat daar een bobbel zit."

Expectation: *"Het zou eventueel nog kunnen dat er nog ergens obstructie is waardoor iets van obstitatie en een bobbel ontstaat. Ik zie dat ze paar maand geleden ook al een echo heeft gehad bij dezelfde klachten en dat er toen niets gevonden is."*

Consultation *"Kijk u ziet hier, de dikke darm zijn we nu naar aan het kijken en als we dan een beetje naar de zijkant gaan is daar de niet ziet u? Dat ligt niet zo heel ver van elkaar, dus dat zou u ook kunnen voelen in theorie."*

Gewoon om aan te geven aan u wat het mogelijk zou kunnen zijn. Want verder zie ik, in de galblaas zitten een paar hele kleine poliepjes van een paar millimeter, 3 of 4 millimeter, maar ja als ze zo klein dan hoeft er verder niets mee."

**Slowing
down**

"Je probeert mee te denken en ja je ziet het niet maar er zijn nog steeds wel.. Ja bij mensen met pijn wat ik niet direct kan vinden, zoals deze patient, dan ga je van alles af in je hoofd juist omdat je het niet vindt. Zoals nu dan ga je ook kijken bij de niet, vooral omdat je het nog niet hebt en ja daar kan het dan ook nog vandaan komen of de darmen dus dan kijk je daar ook naar. Je werkt dan echt die differentiaal diagnose af."

CONSULTATION 13

Patient Woman 47

Application Complaint

"Vrouw met een maagresectie omdat ze een maagcarcinoom had, een tumor. En ze blijft nu pijn houden in haar bovenbuik."

Expectation: "De maag kan ik natuurlijk niet meer zien, dus ik ga kijken of er niet een andere oorzaak is voor de buikpijn, dus dan ga ik alle organen af. De vraagstelling hier is of het niet misschien galstenen zijn dus die staan u wel hoog ja."

Consultation "Ik zie een grote galblaas maar inderdaad geen stenen daarin. Iets verder kijken, hier ook onder de ribben. [...] Oh wacht hier zie ik wel iets, iets heel kleins. Ja, ja"

**Slowing
down** "Ja nou hij lag net iets verder dan dat ik had gekeken en ik had hem denk ik ook niet gezien hoor want het was wel echt een verstopt steentje [...] je moet geconcentreerder opzoek naar wat nou de oorzaak kan zijn. En ook wanneer je dat wel ziet kost het weer moeite om het steentje goed in beeld te krijgen omdat hij zo verstopt ligt en onopvallend is."

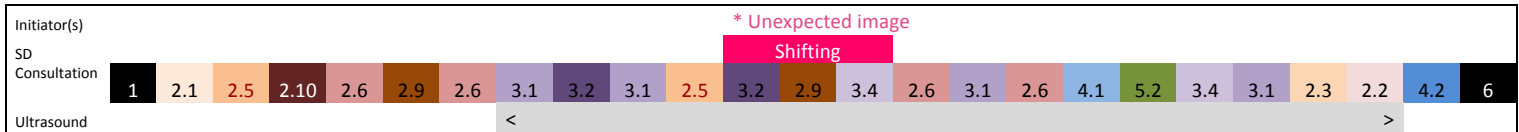
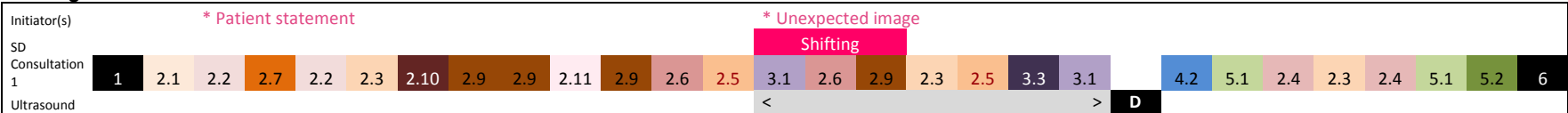
APPENDIX F – FLOWCHARTS

Flowcharts of all *slowing down* consultations are presented below. The legend shows the corresponding number and colours. An overview of these corresponding codes can be found in the consultation codebook (Appendix C).

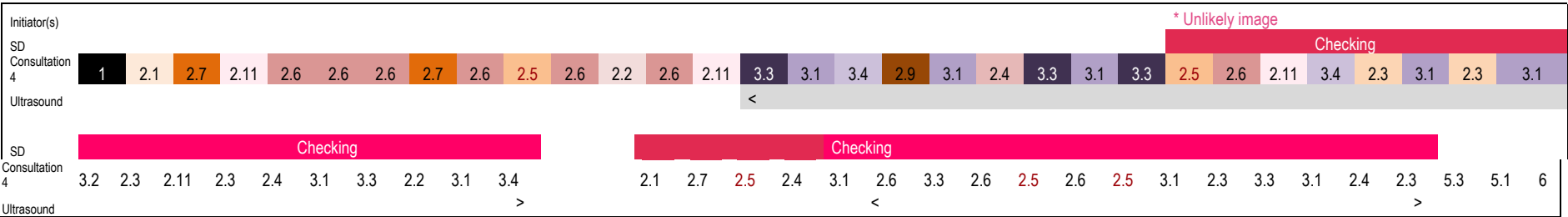
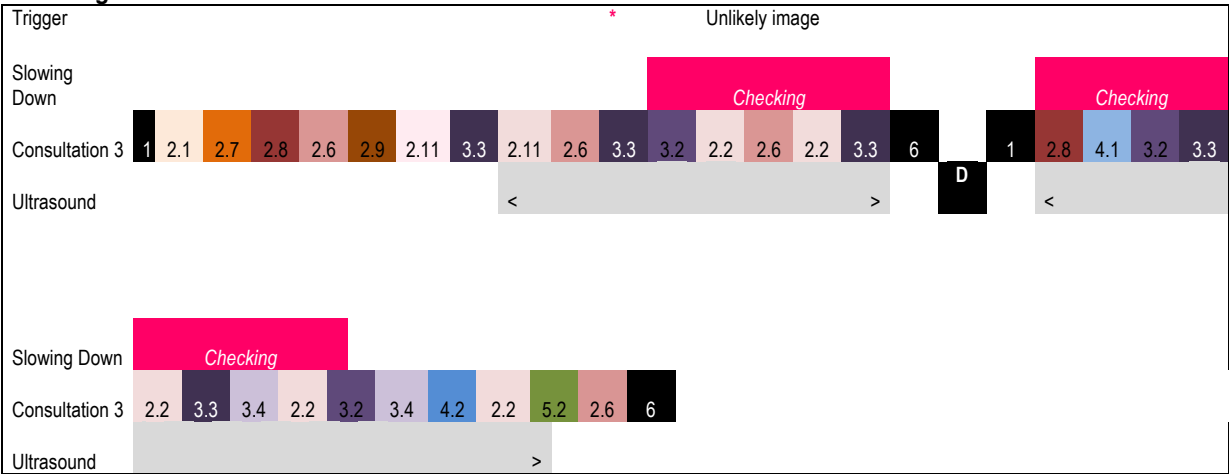
Legend											
Acquaintance & Contact	1										
Anamnesis	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11
Physical Examination	3.1	3.2	3.2	3.4							
Diagnose	4.1	4.2	4.3								
Intervention	5.1	5.2	5.3								
Completion	6										
Discussion with supervisor	D										
Start ultrasound	<										
End ultrasound	>										
Slowing down	*										
Initiator(s)											

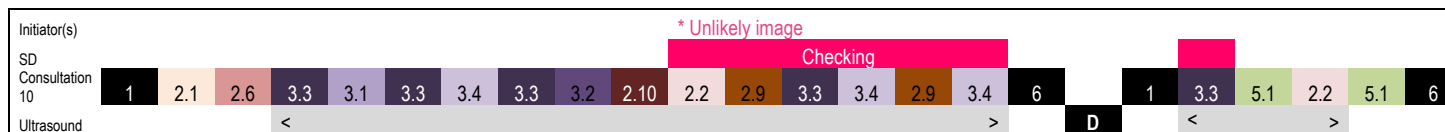
Consultations

Shifting

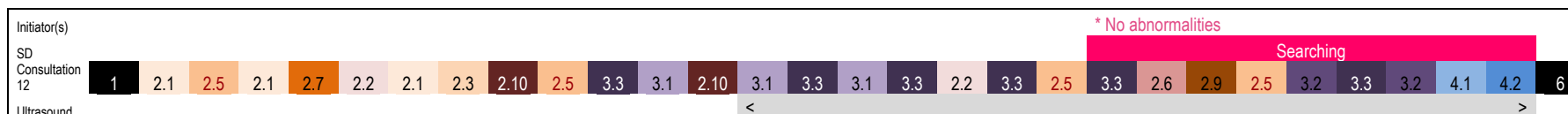
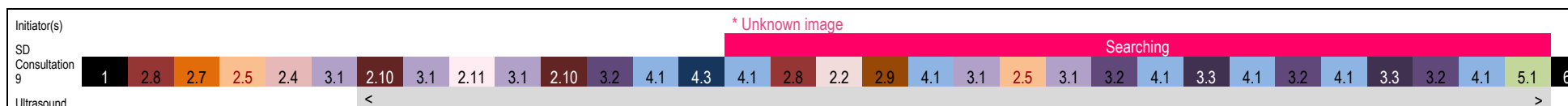
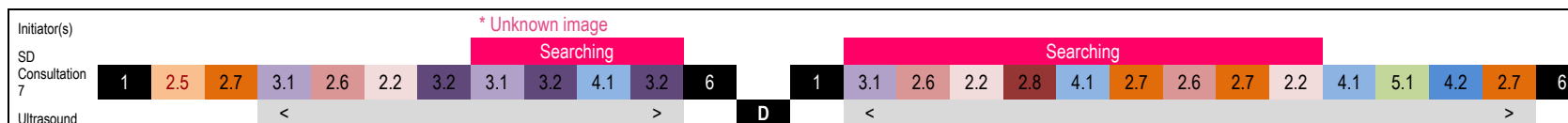
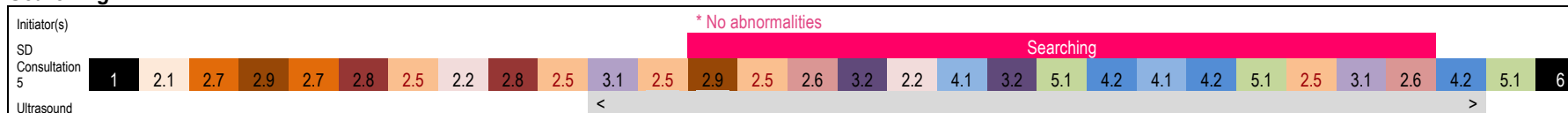


Checking

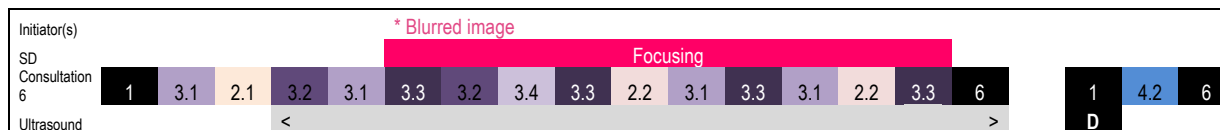
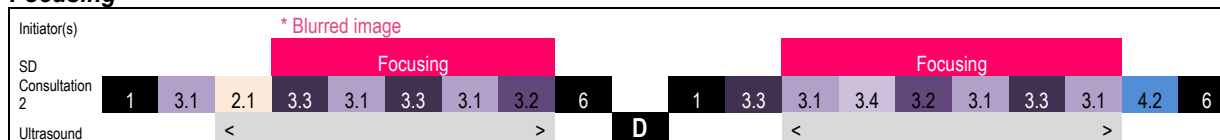




Searching



Focusing



Initiator(s)															
SD															
Consultation															
11	1	2.1	2.6	2.2	2.6	3.1	3.3	3.1	3.2	6		1	3.1	3.3	3.1
Ultrasound	<					>					D	<			

Initiator(s)															
SD															
Consultation															
13	1	2.1	2.10	2.5	2.7	3.1	2.2	3.3	3.1	3.3	3.1	2.9	3.1	3.2	3.1
Ultrasound	<					>					D	<			