

# A qualitative study of experienced clinical teachers' conceptualisation of clinical reasoning in medicine: Implications for medical education

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## Abstract

**Introduction:** Clinical reasoning is an essential part of medical practice. Training medical students to reason competently is, therefore, an essential skill for clinical teachers. Ongoing debate over what clinical reasoning entails and difficulty explicitly teaching and assessing it makes this a challenging task. This study explored clinical teachers' understanding of the concept of clinical reasoning.

**Methods:** Nine experienced clinical teachers participated in semi-structured interviews about clinical reasoning, exploring concepts, experiences, teaching and assessment. Interviews were transcribed and analysed thematically.

**Results:** Ten key themes were identified in relation to participants' understanding of clinical reasoning. These include the findings that clinical reasoning is: essential to medical practice, goal oriented, an applied cognitive process and an unconscious process. Clinical reasoning has several requirements, including knowledge, communication skills, experience and reflection. Participants reported that clinical reasoning is difficult, perhaps impossible, to teach.

**Conclusions:** In this qualitative study, clinical teachers concurred with many of the characteristics of clinical reasoning as it is understood in the literature, but they also challenged assumptions made in medical education research regarding the conceptualisation of clinical reasoning. This has implications for teaching, assessment, student selection and professional development.

**Keywords:** clinical reasoning; qualitative; teaching; medical education.

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## CONCEPTUALISATION OF CLINICAL REASONING

**Introduction**

Clinical reasoning in medicine is an overarching term that refers to a core competency involving cognitive processes by which clinicians arrive at a diagnosis and plan of management (Epstein & Hundert, 2002). A fundamental requirement of licencing bodies is that medical programmes produce graduates at the level of internship who are competent to make sound diagnoses and management decisions. In the context of clinical reasoning in medicine, students and junior doctors are novices and acquire increasing expertise during their postgraduate training and beyond (Durning, Artino, Schuwirth, & van der Vleuten, 2013). Learning clinical reasoning is, thus, considered to be a progressive phenomenon, part of the career-long continuum of medical education of practising clinicians. In many medical schools, the creation of “clinical reasoning:” as a learning domain in its own right is a relatively recent phenomenon (Gay, Bartlett, & McKinley, 2013). In the education of medical students, learning how to develop differential diagnoses and arrive at plans of management is an integral part of the process of history taking, examination and ordering and interpreting investigations that is fundamental to clinical practice (Durning, Ratcliff, et al., 2013).

The assessment of clinical reasoning has been a topic of study and theoretical development since at least the 1960s (Brailovsky, Charlin, Beausoleil, Coté, & van der Vleuten, 2001). Numerous researchers have attempted to demonstrate the reliability and validity of assessment tools for determining clinical reasoning in both novices and experts (Lubarsky, Charlin, Cook, Chalk, & van der Vleuten, 2011). Over the decades, assessment has been attempted in numerous ways, including: via written simulations, such as patient management problems (PMP); the “key features approach”; the script concordance test (SCT); and objective simulated clinical examinations (OSCE) with or without simulated patients (SPs). There is broad agreement in the medical education literature that whatever it is called—be it clinical reasoning, medical problem solving, medical decision making or medical judgement—it should be taught and tested (Kunina-Habenicht, Hautz, Knigge, Spies, & Ahlers, 2015). However, despite the idea that the acquisition and maintenance of clinical reasoning is an important core competency (Durning, Artino, Boulet, La Rochelle, et al., 2012), there remains no clear consensus on what clinical reasoning is or how it is best taught or assessed (Durning, Artino, et al., 2013).

The deceptively simple question of how clinical reasoning is defined and how it should be taught and assessed in medical programmes is the focus of this study. Barrett, Yates and McColl (2015) noted that medical teachers in hospitals are often not included in studies of medical education, in relation to what they think students should be taught. They may also hold different views from researchers as to what various concepts mean and how they are operationalised. Do clinicians think they are teaching “clinical reasoning”? And what do they understand by this term? Rarely is this aspect of validity explicitly addressed as worth considering. To the best of our knowledge, confirmation of whether teachers understand the terminology in the same way it is argued and presented in the medical and health professional education literature has not previously been attempted in a qualitative study. Hence, we sought to ascertain what experienced clinical teachers understand by the term “clinical reasoning”, and we explore how their understandings and conceptualisations might impact teaching and assessment practices.

## CONCEPTUALISATION OF CLINICAL REASONING

## Methods

### *Study design*

Nine experienced medical practitioners who were also clinical teachers from various specialties participated in a semi-structured interview about clinical reasoning. Eligibility criteria included working as a clinician with at least 5 years post-fellowship experience, active involvement in the teaching and assessment of medical students and affiliation with either the University of Adelaide or Flinders University in South Australia. One of the medical schools offered undergraduate entry to medicine, the other offered postgraduate entry.

Participants were identified using purposive sampling (Braun & Clarke, 2013) from university faculty staff listings and recommendations from colleagues. The sampling frame sought men and women participants, from two different hospitals, across a range of specialisations. Direct invitations were sent prospectively to participants via email. Interviews were conducted face to face, in 2014 and 2015, by the first author, and ranged in duration from 37–59 minutes, with an average of 46 minutes. Questions were open ended, encompassing the participants' work background and current scope of practice, experiences of clinical reasoning, the teaching and assessment of clinical reasoning and the remediation of students struggling with clinical reasoning (see Figure 1). Interviews commenced with the participant providing information about their medical training and practice and their involvement in the teaching and assessment of medical students, allowing the interviewer to develop rapport and to interpret answers in the context of participants' experiences. Conceptualisation of clinical reasoning was then explored, with participants asked to describe what the term "clinical reasoning" means to them, and if required, prompts were given, including: how they learned clinical reasoning, and when they use it in both clinical practice and in teaching; how they believe clinical reasoning changes with experience, if at all; and, how, in their view, clinical reasoning is best taught and assessed. Interviews were digitally recorded, manually transcribed and de-identified. Copies of transcripts were subsequently sent to participants to ensure comments accurately represented their views.

Each interview was subjected to preliminary thematic analysis by the first author prior to the following interview. This process of constant comparison (Braun & Clarke, 2013) ensured that an iterative approach to the research was followed, with data from preceding interviews informing subsequent ones. Interviews continued until data saturation (Braun & Clarke, 2013) was reached, with no new themes emerging by the final interview. As with all qualitative research, the aim was not for representativeness (which is a quantitative concept). Instead, we sought richness of data, collected and analysed in a trustworthy and rigorous manner (Tracy, 2010).

Analysis followed the methods described by Braun and Clarke (2006, 2013). The first author maintained an audit trail to document possible themes and to keep a record of the reasoning behind analyses. The interviewer transcribed all data and generated initial codes for each interview. The initial codes were discussed between the three authors, and the second author checked initial codes against the raw data. This process

## CONCEPTUALISATION OF CLINICAL REASONING

- Can you tell me about your medical training and practice? For example, what area of medicine do you practise in? For how long? In what capacity do you currently practise?
- Can you tell me about your involvement in the teaching and assessment of medical students?
- Clinical reasoning is viewed as an integral part of clinical practice. What does the term "clinical reasoning" mean to you?
- What determines the style of reasoning that you use? Is it a conscious or subconscious choice?
- How do you think clinical reasoning develops over time? Has the style of clinical reasoning that you use changed with time?
- Do you think that others reason differently to you?
- Is clinical reasoning something that can be taught? If so, how do you teach it?
- Are some students inherently better than others at reasoning?
- How are the clinical reasoning skills of medical students assessed currently? Do you think this is acceptable?

Figure 1. Sample interview questions and prompts.

continued until the final interview. Themes were then formulated and the raw data checked within and between interviews, with exemplar quotes for themes extracted and potential names for each theme noted. The second author checked the proposed themes against the raw data, and then all three authors considered whether the themes addressed the initial research question and resonated with their own experiences and knowledge from the literature before agreeing upon the results.

### ***Participant characteristics***

Nine participants (6 men, 3 women) were interviewed from a range of backgrounds, including internal medicine (2), surgery (2), paediatrics (1), obstetrics and gynaecology (1), psychiatry (1) and general practice (2). Participants had varying knowledge of clinical reasoning as an area of research, ranging from no prior knowledge to extensive knowledge and previous publication in the medical literature.

### ***Reflexivity statement***

The first author was an undergraduate student in his final year of medical school when he began conducting the interviews. He had been taught medicine by some but not all of the participants. By the time the data had been analysed, he had graduated from medical school, and at the time of writing, he was a trainee in internal medicine. It is possible that participants' responses were affected by a perceived power imbalance when interviewed by a junior colleague with an interest in medical education, although no participant articulated this. The second and third authors were employed as academic staff at one of the medical schools where the research was conducted, and both have careers spanning several decades in research and teaching in medical and health professional education, including clinical reasoning. One is a psychologist; the other is a gynaecologist.

## CONCEPTUALISATION OF CLINICAL REASONING

***Ethics approval***

The University of Adelaide School of Psychology Human Research Ethics Subcommittee and the Flinders University School of Medicine Research and Evaluation Expert Reference Group approved the study.

**Results**

Ten key themes were identified in relation to participants' understanding of the term "clinical reasoning". Clinical reasoning was conceptualised as being fundamental to practising medicine and specific to a patient situation. It has several requirements, namely knowledge, experience, the ability to gather information and reflection. Furthermore, clinical reasoning was felt to be a subconscious process that evolves with time, innate to the individual and difficult, if not impossible, to teach.

***Essential***

Participants were clear that clinical reasoning is a fundamental competency that is one of the foundations of all aspects of the practice of medicine and that *"everyday functioning requires clinical reasoning"* (Participant 1).

*The whole idea of you being a successful doctor, in terms of being able to manage patients and their problems, is for you to be effective and good at the process of clinical reasoning.* (Participant 2)

Despite participants stating that clinical reasoning was essential to medicine, there was some cynicism about trying to define the *"practice of the art of medicine"* (Participant 2).

*To me, clinical reasoning is a bit of a current buzzword. ... There's a new buzzword every year.* (Participant 2)

***Goal oriented***

Clinical reasoning was discussed as being specific to a particular diagnostic or therapeutic problem in a patient encounter, with the goal being to formulate a management plan.

*It [clinical reasoning] means trying to deduce from a very thorough history, clinical examination ... to treat those examination findings with a pinch of salt but still take heed of them and formulate some sort of plan.* (Participant 4)

***Requires synthesis***

Participants explained that the synthesis of knowledge was important as part of the process of clinical reasoning.

*Clinical reasoning is synthesising the information that you have before you to make a decision about how best to look after a patient.* (Participant 7)

This synthesis was seen to include interdisciplinary knowledge as well as other clinical information.

## CONCEPTUALISATION OF CLINICAL REASONING

*I think in complex environments, a variation can be helpful. Especially when you work in a position where you get different views. That can be quite complementary for a patient's outcome. That's why you do consultations. Someone's thinking a bit differently, has a slightly different perspective with what they're doing, and you can draw on that experience and different thinking to solve a problem. (Participant 9)*

**Applied cognitive process**

Clinical reasoning, according to participants, requires the consideration and weighting of information to arrive at a decision. This process is underpinned by “common sense” (Participant 4) and is more than simply “thought and deduction” (Participant 2). It is, rather, “a process of logical deduction” (Participant 2).

*Clinical reasoning is an applied process. It's a cognitive process that involves making sense of the information pertaining to a certain clinical situation. (Participant 1)*

**Requires knowledge**

Participants believed that clinical reasoning must be underpinned by foundational knowledge. Some thought there needed to be substantial knowledge.

*There needs to be some basic knowledge about physiology, biochemistry and things like that. There's got to be a lot of knowledge. You have learned that at some point along the way. (Participant 6)*

Others felt that knowledge, though required, was not as important as other cognitive processes.

*You need a little bit of knowledge, but predominantly you need common sense. (Participant 8)*

**Requires experience**

Participants explained the role of experience in the development of clinical reasoning through repeated exposure to clinical presentations.

*Clinical reasoning, apart from articulating and making it obvious to people that they can learn to do it, relies very heavily on your past experience. (Participant 9)*

Clinical reasoning was also seen to be important at an individual patient level.

*Clinical reasoning does imply a certain familiarity with patients and their illness. You only get that through experience. (Participant 2)*

Experience was seen to “give you perspective” (Participant 2), with increased experience directly correlated to an increased ability to reason. On the other hand, participants explained that the process of learning to reason based on experience is a life-long, continual process.

*It's constantly evolving. ... You learn every day but the reasoning changes much more slowly. It doesn't stay rigid. (Participant 4)*

## CONCEPTUALISATION OF CLINICAL REASONING

However, not all participants agreed that experience is equivalent to improved clinical reasoning.

*It probably is. But it's experience with reasoning along the way. There's no rationale ... do it 15 times and then you're better. ... I can do it 15 times, and I still haven't learned a single thing.* (Participant 8)

**Requires reflection**

The ability to reflect was seen as core to the development of clinical reasoning.

*The person's ability to have reflective capacity is part of the development of clinical reasoning, as well.* (Participant 1)

As part of an integrated approach to teaching decision making, reflection was considered to be a skill that should be taught in the context of developing clinical reasoning from early in medical training. However, not all participants agreed that clinical reasoning should be part of the early curriculum.

*To put clinical reasoning to someone in first year at medical school, I think, is just wishful thinking.* (Participant 2)

The ability to reflect was seen to be different amongst individuals and dependent upon "emotional intelligence".

*People with high EQ do that automatically, and others go on obliviously throughout life without ever reflecting.* (Participant 4)

It was acknowledged that reflection could be challenging.

*Reflection can be uncomfortable because you realise that you didn't do things well so you get uncomfortable. You have to realise that it's for the greater good to do it. It doesn't matter whether you know that or not; it can be very uncomfortable. The more you do it, the more you get used to it, and then it's not an issue. And that's why we try to introduce it very early, so it shouldn't be a bad thing.* (Participant 4)

Whilst sometimes difficult, the process of reflection was considered a catalyst for clinical reasoning.

*Sometimes when I do that, that's when it all gels together.* (Participant 6)

**Requires communication skills**

Participants discussed the need for communication skills in two contexts. One was in relation to medical communication skills (including the ability to ask open-ended questions, demonstrate empathy and so on).

*You've got to be able to communicate with your patients and ask the right questions, as well.* (Participant 6)



## CONCEPTUALISATION OF CLINICAL REASONING

A further context was in relation to students and trainees whose first language is not English. They argued that this potentially affected their ability to communicate clinical reasoning effectively.

*Not trying to generalise, obviously there are some groups of international students where language ... English is not their first language. And they appear to have a lot of difficulty trying to reason. Is that because of their thought processes? A cultural issue? A language issue? It's very hard to tell. (Participant 5)*

***Unconscious—a reflex***

Participants described clinical reasoning as “like a reflex” where “pattern recognition” becomes more important” (Participant 1), with “experienced people doing it automatically but with the ability to recognise when it's not fitting into the pattern and stop and go back and do the additional detail” (Participant 3). “Intuitive” (Participant 6), “subliminal” (Participant 7) or “gut-feeling” were also described.

*Gut feeling is ... You look at someone ... use your clinical judgment ... and think something doesn't look right here. This person isn't well. I suppose that's experience as well. But sometimes you wonder if there's an element ... that art ... it's very easy for busy people when they're seeing lots and lots of patients ... it's just that sort of thing about someone who you think ... no, that person is really sick and shouldn't be ignored. And could easily be ignored in a busy environment. I don't know whether you would call that gut feeling or whether you would call that true experience. (Participant 5)*

Participants described moving between automatic thought and more considered, conscious reasoning processes.

*It can be [a reflex]. If you have strong metacognitive developed skills then you can make it a conscious process when you need to, but a lot of it is a balance between those heuristics ... short-hand thinking and analytical deduction. A really skilled clinician can use both simultaneously. (Participant 9)*

***Cannot be taught***

Despite all participants being teachers of medical students on clinical placements, a clear theme that was apparent was that clinical reasoning is not easy to teach and in fact, perhaps for some students, cannot be taught at all. Reference was made to the ability to reason as a clinician being innate.

*To have sound clinical reasoning as a clinician, there is an element that cannot be taught. I don't know what you want to call it ... whether it's an intellectual capacity, or just the way that someone thinks or judgment. It's very hard to teach judgment; it's kind of innate. Some people either have it or they don't. (Participant 1)*

The ability to reason and to learn to do so as a student was seen to have clear individual variation, with it sometimes being the case of a “fundamental lack of clear ability to think” (Participant 8).



## CONCEPTUALISATION OF CLINICAL REASONING

*My impression is that some students can see what the problem is and know what they need to do to sort it out, whereas other students can't see the trees from the forest. They don't seem to be able to rank the importance of different findings or medical issues. (Participant 5)*

Participants were clear that clinical reasoning requires active learning.

*It's not something that's easily taught. You can to an extent teach it in lectures and tutorials, but you need to be doing it in order to gain a practical applied skill. (Participant 1)*

Participants could not recall being taught clinical reasoning as part of their medical education. Some conceded that they may have been taught but cannot remember.

*I was being taught information and skills, but in that, I'm sure I did acquire some clinical reasoning ability, but I don't remember it being explicitly stated that it was part of the programme . (Participant 1)*

Others were clear that they were not explicitly taught clinical reasoning but that the expectation was that it was something that just developed over time (Participant 7).

*I would absolutely have to say that no-one taught me this stuff at all. Through all of my training, no-one ever taught me about thinking. I was never taught it. I sort of self-taught that. (Participant 9)*

This lack of teaching meant that patient care was compromised.

*For us, the people of my generation, we learnt by experience. We learnt by our mistakes. (Participant 3)*

Participants expressed a view that in current medical education, clinical reasoning is still not taught.

*I don't think anyone is readily taught it. (Participant 8)*

It was suggested that clinical reasoning is learned vicariously.

*To be honest, I think it's almost by osmosis. (Participant 6)*

Despite the assertion that clinical reasoning cannot be taught, it was stated that “it's something that can be taught” (Participant 5) although with caveats.

*That's where you have the tools of clinical skills ... being able to take a proper history, going back to the structure ... to the basics and doing a proper physical examination. And it doesn't matter what stage of life you are at, however experienced you are ... you have to go back to that basic structure and platform and that will help you with your acumen or your reasoning. That can be taught. The basic structure. Whether it gives rise to the same reasoning in each individual person, I think that varies. (Participant 5)*

Assessment of clinical reasoning was also considered problematic, as the holistic nature of the process was considered difficult to quantify into component parts.

## CONCEPTUALISATION OF CLINICAL REASONING

*If you're trying to identify clinical reasoning as something you can measure, I don't think there's one little test that you can use. You've got to take a whole lot of things and add them all up. And that's very difficult to do. (Participant 2)*

The dilemma of how to best assess clinical reasoning returned to the problematic nature of being able to understand what it is.

*No-one really knows how clinical reasoning works. And we talked about how everyone has a different way of getting there. But if everyone has a different way of getting there, we still need to have a way of making sure that everyone is getting to the same place. So we might not be teaching it, but we should be assessing it properly. And I don't think we are. (Participant 6)*

## Discussion

This research adds to the existing literature by interviewing experienced medical practitioners, working in both clinical and university settings, to establish what they understood by the term “clinical reasoning” and to explore how the findings might impact teaching and assessment practices in medical programmes.

Many of our findings are consistent with the literature on this topic (see for example, Lubarsky, Dory, Duggan, Gagnon, & Charlin, 2013). For instance, participants believed that clinical reasoning is an essential competency, involving cognitive processes required to manage patients and their medical problems. They identified that reasoning is contextual and applied to specific clinical situations (Eva, 2004; Durning, Artino, Boulet, Dorrance, et al., 2012). Participants identified that clinical reasoning has a heuristic element (i.e., arriving at decisions by a process of non-analytical pattern recognition); they also recognised that analytical processes and heuristics are not mutually exclusive phenomena, and that differently trained groups bring different perspectives to a clinical problem, to the potential benefit of the patient. Reflection was identified as core, as has been discussed in the literature previously (see for example Linn, Khaw, Kildea, & Tonkin, 2012). The challenges for students for whom English is not their first language was also identified by our participants, as it has been in previous studies (Dhaliwal, 2009).

However, participants also discussed their conceptualisation of clinical reasoning in ways less well established in the medical education literature. Definitional issues complicate the effective teaching and assessment of clinical reasoning. While participants could define clinical reasoning in general terms, understanding the process of clinical reasoning in greater detail in a step-by-step approach proved challenging. In the context of teaching clinical reasoning skills to novices, or developing the clinical reasoning skills of experts, this research identifies that clinical teachers believe that clinical reasoning ultimately cannot be taught, i.e., competence in clinical reasoning is acquired and, to a greater or lesser extent, is dependent on the intrinsic characteristics of the individual and is enhanced with experience, or caseload, over time. Our findings are consistent with the position argued by Gay et al. (2013) that in medical schools, staff may believe that clinical reasoning is a skill learned vicariously, and thus, it is not

## CONCEPTUALISATION OF CLINICAL REASONING

explicitly taught. Participants in our study also identified that different experts will use different reasoning strategies and techniques yet arrive at the same conclusion. The implication, therefore, is that teachers should not focus on teaching novices how to think *per se* but rather concentrate their efforts on teaching the basic clinical skills (history taking, examination and the interpretation of investigations) and exposing students to clinical challenges of appropriate difficulty that require them to think, in their own ways. It is noteworthy that throughout the interviews, as evidenced by the extracts, participants' philosophy of teaching was made evident through their notion of traditional, didactic approaches. There was also a tendency to consider problems with learning from a deficit model, focusing on student weaknesses rather than viewing them as an opportunity to consider different teaching and learning approaches to improve the acquisition of clinical reasoning competencies. These are challenging findings for medical programmes, presenting a disconnection between established medical education literature and the experiences of clinical teachers in the real-world environment. If the clinical teachers are correct, this raises real issues in relation to the teaching of clinical reasoning, particularly for the allocation and prioritisation of teaching resources. For example, exposing novices to developmentally appropriate clinical encounters to enhance their clinical reasoning ability may be high yield but is limited by the resources required, namely patients, clinical educators and time. Alternatively, our findings may suggest that experienced medical practitioners lack self-awareness with regards to the development of their own clinical reasoning ability over time, and thus, faculties may have a major investment to make in "training the trainers". Paradoxically, some participants indicated that they actively teach clinical reasoning to medical students whilst stating they were never taught how to reason themselves.

There are obvious limits to a reductionist approach that considers clinical reasoning in isolation from other critical characteristics for successful medical practice, such as sound professionalism and clinical skills. Clinical reasoning skills are not amongst the nine core competencies identified by stakeholders as very or extremely important for entering medical students (Koenig et al., 2013). The inference is that stakeholders anticipate that clinical reasoning will be learned at medical school by "osmosis", as one participant in our study expressed it. Our findings suggest that clinical teachers may not believe that they can achieve this learning objective for all students.

It was generally understood that clinical reasoning involved skills that are innate to the individual, including the ability to communicate effectively, to reflect on experiences and to synthesise data to form a decision. The fundamental question of whether any competencies in medicine, or in fact, in any other area of life are "innate" or learned is beyond the scope of this paper. For our participants, their belief was that clinical reasoning cannot be taught to some students. Furthermore, this inability was identified as a weakness in the student rather than the teacher. This prompted participants to question whether students require pre-existing reasoning ability or whether this can be nurtured or developed throughout the medical curriculum. Research in medical and other health professional education is clear that clinical reasoning is developed through training and learning (Durning, Ratcliff, et al., 2013), but it is noteworthy that our participants were not convinced of this.

## CONCEPTUALISATION OF CLINICAL REASONING

The strengths of this study include that it is the first qualitative research, to the best of our knowledge, that has asked clinicians to articulate what they think clinical reasoning is and how they teach it. Drawing upon qualitative research methodology (Tracy, 2010), our findings resonate with previous literature and offer novel findings to add to current knowledge and debate.

The limitations of this study include that our participants were clinical teachers from only two medical programmes in one state of Australia. Our findings might not be generalisable to other schools in other states of Australia nor internationally. Furthermore, we have not attempted to establish whether the views of our participants are consistent with those of opinion leaders in medical education or medical students on what constitutes clinical reasoning or whether the findings could be relevant to clinical reasoning in non-medical contexts, such as nursing. Further research could include triangulation of the data of clinical teachers', students' and medical education researchers' perceptions of clinical reasoning. In addition, by surveying medical educators and clinical teachers across a range of teaching hospitals and universities, further research might also include quantitative surveys to ascertain whether the notion that clinical reasoning cannot be taught and is "innate" is widely held.

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## CONCEPTUALISATION OF CLINICAL REASONING

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