Journal of Psychoeducational Assessment
2015, Vol. 33(7) 652–661

DOI: 10.1177/0734282914562212
jpa.sagepub.com
SAGE

What Comes Before Report Writing? Attending to Clinical Reasoning and Thinking Errors in School Psychology

Gabrielle Wilcox[1] and Meadow Schroeder[1]

Abstract

Psychoeducational assessment involves collecting, organizing, and interpreting a large amount of data from various sources. Drawing upon psychological and medical literature, we review two main approaches to clinical reasoning (deductive and inductive) and how they synergistically guide diagnostic decision-making. In addition, we discuss how the use of both mental shortcuts (i.e., heuristics) and cognitive biases, which we collectively refer to as thinking errors, can lead to errors in judgment when analyzing data. In particular, we highlight where and how common thinking errors may interfere with school psychologists' reasoning throughout the assessment process. Last, we make suggestions on how to reduce errors in judgment and improve clinical reasoning skills by focusing on training, supported clinical practice, and personal strategies.

Keywords

clinical reasoning, cognitive biases, assessment, diagnostic decision-making

Assessment comprises a significant portion of the work conducted by school psychologists whether they use a cognitive assessment or a Response to Intervention (RtI) model (Bramlett, Murphy, Johnson, Wallingsford, & Hall, 2002). A largely invisible process, clinical reasoning is iterative and involves the systematic testing of hypotheses through the collection, interpretation, and integration of clinical data; however, this process is not without challenges, and school psychologists, like everyone, are prone to errors in their thinking. Consequently, we must be aware of how errors can affect our practice. In our experience and examination of the literature, school psychology training programs do not explicitly teach students clinical reasoning or how to monitor themselves for thinking errors. This potentially leads to poor case conceptualization, which, in turn, leads to weak organization, diagnostic impressions, and recommendations in psychoeducational reports. It is our opinion that developing and intentionally applying clinical reasoning will lead to a more informed understanding of student strengths, needs, and environmental contributions as well as more competent practice.

Although some research on clinical reasoning in school psychology was conducted in the 1990s (e.g., Davidow & Levinson, 1993; Kennedy, Willis, & Faust, 1997), the topic has since,

[1]University of Calgary, Alberta, Canada

Corresponding Author:
Gabrielle Wilcox, Educational Psychology, University of Calgary, 2500 University Dr. NW, Calgary, Alberta, Canada T2N 1N4.
Email: gwilcox@ucalgary.ca

with limited exceptions, been neglected by the field (Lilienfeld, Ammirati, & David, 2012). Thus, we have drawn upon research from the medical field, which has recognized the importance of examining clinical reasoning in training and practice. Consequently, the field of school psychology may benefit from examining the steps medical education research has taken in determining how best to teach and apply the process of clinical reasoning and to minimize bias. By examining medical research, we are not promoting the medical model. Rather, we recognize that both fields task professionals with making sense of a large quantity of information that clients disclose including biological, developmental, and social factors. The following sections outline types of clinical reasoning, describe how cognitive biases and misapplied heuristics potentially interfere with accurate assessment, and provide suggestions for how to improve clinical reasoning and decrease error.

Types of Reasoning

Broadly speaking, there are two types of clinical reasoning, deductive and inductive, utilized by both medical and psychology practitioners. *Deductive reasoning* follows the scientific method and involves systematic data collection to test hypotheses (Vertue & Haig, 2008). Deductive reasoning, though, has limitations when applied to psychological assessment. It is a time-intensive process because information must be compared with each of the hypotheses being considered (Wolf, Gruppen, & Billi, 1988). However, due to time constraints or inaccessible information, psychologists regularly make decisions without all of the needed evidence.

In comparison, *inductive reasoning* is less systematic and overt, accommodating for incomplete data and subsequent uncertainty. It is a sophisticated pattern recognition process gained through the experience of repeatedly applying deductive reasoning to similar cases. Thus, what appears to be a gut decision during the diagnostic reasoning process is actually the application of rules learned through experience. By recalling similar cases and using mental shortcuts, inductive reasoning places fewer demands on working memory and increases efficiency (Kassirer, Wong, & Kopelman, 2010; Norman, 2009).

Research suggests that reasoning evolves as practitioners develop clinical skills. Novice clinicians rely heavily on the time-intensive process of deductive reasoning because each case is unfamiliar (Thammasitboon & Cutrer, 2013) while proficient clinicians smoothly switch between both types of reasoning as needed (Balla, Heneghan, Glasziou, Thompson, & Balla, 2009); using inductive reasoning for routine cases and relying more heavily on deductive reasoning for unfamiliar cases (Brammer, 1997).

Heuristics, Cognitive Biases, and the Assessment Process

Heuristics are mental shortcuts, or rules of thumb, developed through experience. They are an integral aspect of inductive reasoning as they are a means to deal with unmanageable amounts of data efficiently and accurately (Norman & Eva, 2010). While they are often useful, if applied incorrectly, heuristics can lead to inappropriate diagnostic decisions. Heuristics differ from diagnostic criteria in that the latter are a set of symptoms clinicians use to form a diagnostic opinion, while heuristics are mental shortcuts that are not specific to diagnostic decision-making and can be applied broadly.

Cognitive biases, however, are errors in reasoning. While research on diagnostic accuracy in psychology is sparse, there is no reason to believe that psychologists are exempt from these errors. Ironically, an overarching bias is the *bias blind spot* or the belief that one is not prone to these biases (Lilienfeld et al., 2012). One aim of this article is to help clinicians recognize that we are all susceptible to thinking errors, which ultimately affect the assessment process. The following section identifies cognitive biases and commonly misapplied heuristics, which we collectively refer

to as *thinking errors*, and how they could interfere with the psychoeducational assessment process. While some thinking errors fit into more than one category, they have been separated into the general stages of the assessment process to provide specific examples of where and how they could interfere (see Table 1).

Referral

Assessment typically begins with a referral question. Clinicians form initial hypotheses from the referral, which then influences how they gather and interpret additional information. When thinking errors occur at the beginning stage of assessment, subsequent data may be inadequately or inaccurately interpreted, potentially leading to inaccurate diagnostic conclusions (Graber, Franklin, & Gordon, 2005; Norman, 2009).

The *anchoring heuristic* and the *framing effect* are examples of thinking errors that may affect the initial stages of assessment. When misapplying the anchoring heuristic, clinicians fit new information into the initial hypothesis rather than considering the new information and adapting hypotheses (Dumont, 1993; McDermott, 1981). In other words, clinicians' initial impressions act as an "anchor" for the data that follows. In one example, school psychologists were provided data and told that a student was referred for either giftedness or a learning disability (Davidow & Levinson, 1993). Although the assessment results were the same for both referrals, the psychologists rated the appropriateness of the current student placement differently depending on the referral information.

Furthermore, how information is presented (*framing effect*) influences decision-making (Kahneman, 2003). Whether the presented information focuses on how much could be gained or lost from a decision affects risk-taking propensity (Tversky & Kahneman, 1981). In a study of school psychology and educational administration doctoral students, participants picked safer (statistically more effective) choices when the number of students who would have a positive outcome from an intervention was identified. When the number of students who would have a negative outcome in spite of the intervention was highlighted, however, participants picked riskier choices (statistically less effective; Fagley, Miller, & Jones, 1999).

Data Gathering

Within the data gathering stage, we discuss five potential thinking errors. First, *confirmation bias* is closely related to the theory of cognitive dissonance, suggesting that information which challenges our ideas makes us feel uncomfortable and causes us to search out information supporting our ideas to relieve that discomfort (Festinger, 1957). Confirmation bias is a particularly insidious problem as evidenced by the tendency to attend to the perceived strongest hypothesis and to recall more cases and studies that support underlying suppositions of that hypothesis (Nickerson, 1998). Second, *motivated skepticism*, in which we over-analyze data incongruent with our views while uncritically accepting data that supports our views (Ditto & Lopez, 1992), is similar to confirmation bias. To illustrate, if clinicians hypothesize that a child has attention-deficit hyperactivity disorder (ADHD), they would demonstrate confirmation bias if they focused on presenting symptoms exemplifying ADHD to the exclusion of contradictory evidence. In turn, clinicians engaging in motivated skepticism would over-analyze symptoms incongruent with ADHD.

The last three thinking errors noted at this stage relate to the amount of time spent gathering data. In *search satisficing*, clinicians view the initial information collected as adequately supporting their primary hypothesis, come to a diagnostic decision, and prematurely end the assessment (Lilienfeld et al., 2012). However, clinicians sometimes spend considerable time gathering data before a contradictory hypothesis emerges. Because of the time invested in investigating this hypothesis, clinicians might be reluctant to invest additional effort on ruling out the alternative

Table 1. Examples of Misapplied Heuristics and Cognitive Biases During the Assessment Process.

Stage	Thinking error	Definition	Example
Referral	Anchoring heuristic	Initial impressions influence how new information is weighed.	You receive a referral accompanied by a previous psychoeducational report. Although the student's functioning has changed considerably since that time, your view of the student's current functioning is influenced by the diagnostic conclusions in the previous report.
	Framing effect	Whether the problem is presented positively or negatively impacts risk-taking in decision-making process.	A teacher referring a student for behavioral problems confides concern that the student will be expelled from school without supports afforded by individualized programming, which influences your interpretation of the data.
Data gathering	Confirmation bias	Seeking out information that confirms our hypothesis.	You hypothesize that a child has ADHD and focus your assessment looking for symptoms of ADHD.
	Motivated skepticism	Closely examining data that is contrary to our favored hypothesis.	You hypothesize that a student has a learning disability, but the parent thinks that there is a poor fit with the teacher. You look very carefully at the classroom with a focus on evidence of a positive fit.
	Search satisficing	Ending the hypothesis testing and data-gathering process after an initial decision is made.	Your hypothesis makes sense and the initial data fits, so you do not do more assessment to rule out other hypotheses.
	Sunk costs	The more time, effort, and assessment we invest in a decision, the more we hold onto it.	You have conducted assessments over 3 days and have formulated an initial diagnosis and conclusion. A colleague suggests another, contradictory hypothesis, and you dismiss it.
Data analysis	Availability heuristic	The easier it is to recall a similar case means that it is more probable.	You assessed a memorable student with symptoms of anxiety who was abused, and you actively look for abuse with other students who have symptoms of anxiety.
	Representative bias	Determining probability of a problem based upon similarity to a prototype.	You conceptualize students with suicidal behaviors to have a specific group of characteristics, resulting in incorrectly considering some students and not others for treatment.
Decision-making	Inconsistency	Applying decision rules differently in different cases.	You determine that a student eligible for services, even though the evidence is equivocal, because the parents are threatening a Due Process hearing.
	Belief perseverance	Continuing to hold a decision in spite of contradictory evidence.	A student was referred for a learning disability, and the work samples the teacher gave you support this. Although assessment data suggest adequate academic skills, you continue to believe that the student has a learning disability.
	Fundamental attribution error	Determining that the client's problems are due to internal, character flaws.	You ignore the impact of homelessness on academic performance and determine that this student has a learning disability.
	Overconfidence bias	Confidence in our decisions even when we are wrong.	You rate your level of confidence as high in spite of the fact that the eligibility decision was incorrect.
	Base-rate neglect	Ignoring prevalence rates.	You do not realize that it is not likely for all three students you categorized as Intellectually Disabled in the same grade to actually fit that category because prevalence rates are not that high.
Throughout assessment	Affect/visceral bias	Impact of emotional state (positive or negative) on decisions.	You have a strong negative emotional response to a student, which affects your interpretation of the data.
	Bias blind spot	The belief that one is not prone to the biases that others are prone to.	You recognize that school psychologists are prone to biases but believe that these biases do not impact your decision-making.

hypothesis (*sunk costs*; Croskerry, 2003b). Finally, choosing among competing hypotheses too early in the process, or *premature closure*, is another common diagnostic error due, in part, to failing to consider reasonable alternative hypotheses (Graber et al., 2005).

Data Analysis

When clinicians analyze data, they should consider their susceptibility to misapply two heuristics. The *availability heuristic* is the tendency to consider a diagnosis because it is easy to recall a similar case (Bordage, 1998; Davidow & Levinson, 1993; Elstein & Schwarz, 2002). Clinicians might, for instance, have a memorable case of a child diagnosed with anxiety who was also abused. In subsequent cases of anxiety, clinicians may actively look for symptoms of abuse. Relatedly, the *representative heuristic*, when misapplied, leads to overestimating the probability of a particular diagnosis by comparing the case to a prototype case. Clinicians may consider a diagnosis for some students based on prototypical characteristics (e.g., students who are noncompliant have Oppositional Defiant Disorder) while overlooking other symptoms that might indicate an alternative diagnosis.

Decision-Making

Decision-making is perhaps the most vulnerable stage to cognitive biases. *Fundamental attribution error* is a cognitive bias whereby individuals credit their own negative behavior to external circumstances and others' negative behavior to personal characteristics (Aldeman & Taylor, 1979). Clinicians must be aware of this bias as they attempt to determine the etiology of academic and behavioral challenges. Clinicians must also consider possible attribution error when interpreting teacher ratings and reports of student behavior, as this may impact their perceptions of the underlying causes of student behavior (Aldeman & Taylor, 1979). *Affect bias*, which is the impact of emotional state (positive or negative) on one's reasoning, may result in visceral reactions, interfering with clinical judgment (Garb, 2005). Combined, these two biases could have a compounding effect on clinical judgments.

To exacerbate the outcome of these biases, individuals also have a tendency to be overconfident in their decisions (*overconfidence bias*) and maintain high levels of confidence in spite of contradictory evidence (*belief perseverance*). Unfortunately, confidence does not guarantee precision, and research suggests that there may be an inverse relationship between confidence and diagnostic accuracy (Brammer, 1997; Dumont, 1993). For example, in medical case study scenarios, residents and physicians maintained a high level of confidence in their incorrect diagnoses even when given evidence supporting the correct diagnosis. Although medical practitioners readily acknowledged that diagnostic errors are frequent, they were reticent to acknowledge that they personally may have made diagnostic errors (e.g., *blind spot*; Berner & Graber, 2008).

While *diagnostic inconsistency* among jurisdictions poses a problem, school psychologists have also been found to inconsistently apply diagnostic criteria within their own practice (Davidow & Levinson, 1993; McDermott, 1981). In some cases, school psychologists feel compelled to adjust their diagnostic decision-making because of time limitations or pressure from parents and/or administrators to make students eligible for academic supports or special services.

Failing to consider prevalence of a specific disorder leads to another thinking error: *base-rate neglect*. Some school psychologists may struggle with base-rate neglect, allowing other diagnostic information to cloud their reasoning (Elstein & Schwarz, 2002; Garb, 2005; Kennedy et al., 1997). For instance, if a student appears to fit the criteria for Developmental Coordination Disorder (DCD), as clinicians we need to seriously consider the possibility that our hypothesis is incorrect because of the low base rate for the disorder (1.8%; Lingman, Hunt, Golding, Jongmans, & Emond, 2009).

These thinking errors affect how clinicians collect data, the amount collected, and the way in which the data are interpreted. School psychologists are often caught between the professional and ethical demands of completing evidence-based assessments that provide a clear picture of student strengths and needs to inform interventions and the bureaucratic demands of understaffed schools and high caseloads which encourage efficiency. As a result, professional pressures increase the vulnerability that school psychologists may make thinking errors in their clinical reasoning during assessments.

Suggestions to Improve Clinical Reasoning and Minimize Thinking Errors

Although the combination of education and experience often increases effective clinical reasoning, it is not guaranteed to do so. To increase the clinical reasoning skill of novice clinicians, it may be beneficial to intentionally teach school psychology students to use both deductive and inductive reasoning, how to determine when and how reasoning is likely to be subject to error, and how to prevent those errors through didactic instruction, supported practice, and teaching self-regulation strategies (see Table 2; Norman, 2009).

Instruction

Instruction in clinical reasoning should be systematically integrated throughout the curriculum. When students transition into independent practice, they will have few opportunities to receive feedback about their effectiveness, and the feedback they receive will often be distal. Graduate school is an ideal time to provide clear, immediate feedback not only about students' diagnostic accuracy but, more importantly, about their clinical reasoning: teaching students how to think like psychologists. The development of clinical reasoning skills can be supported during didactic instruction. First, when introducing clinical reasoning skills, instructors can initially focus on deductive reasoning through case studies while engaging in a think-aloud process, describing why some information is important and other information is not (Moulton, Regehr, Mylopoulos, & MacRae, 2007). For example, when reviewing background information in a case study, an instructor may suggest that the third-grade teacher's report card comments of poor social skills is less meaningful because report card comments from three other teachers and parents all indicate age-appropriate social skills. Throughout the reasoning process, instructors can discuss the potential impact of thinking errors as well as emotional and physical states on decision-making (Croskerry, 2003a; Rencic, 2011; Thammasitboon & Cutrer, 2013). This requires instructors to find or create high-quality examples and case studies for students to gain meaningful experiences and start to notice patterns (Kassirer et al., 2010). Instructors can scaffold the learning process by initially organizing the data for students with clear explanations before slowly increasing expectations and student responsibility for judging the utility of information (Gruppen, Wolf, & Billi, 1991).

Second, experienced clinicians do not rely on deductive reasoning alone, and research has suggested that instruction in using both deductive and inductive reasoning increases diagnostic proficiency. In a study where undergraduate psychology students, ensuring their novice status, were taught to make diagnoses based on electrocardiograms (ECGs), students who were simply advised to use both deductive and inductive streams were more accurate in their diagnoses than those who did not receive this instruction (Eva, Hatala, LeBlanc, & Brooks, 2007). Students who used only inductive strategies overlooked important information; whereas those who used only analytic strategies were distracted by unusual data.

Not effectively balancing deductive and inductive reasoning can impact school psychologists' practice. Exposing students to case studies throughout their training and providing supportive scaffolding will help students develop the pattern identification skills necessary for inductive

Table 2. Teaching Clinical Reasoning Skills.

Instruction	
Deductive reasoning	Teach students how to apply deductive reasoning processes to psychoeducational assessment. Use case studies to provide experience with the complexity of potential cases. Scaffold the process: Provide support in understanding how to reason through information by using think-aloud processes to identify what information is and is not important. Initially organize the information for students using the case conceptualization format/process students are expected to use (Gruppen, Wolf, & Billi, 1991; Kassirer, Wong, & Kopelman, 2010; Moulton, Regehr, Mylopoulos, & MacRae, 2007).
Dual process reasoning	Encourage students to look for similarities to previous cases (e.g., case studies, experience) while also carefully consider the data and other possible hypotheses (Eva, Hatala, LeBlanc, & Brooks, 2007).
Thinking errors	Teach how thinking errors interfere with clinical reasoning. Encourage students to identify potential thinking errors and what they can do to guard against them (Croskerry, 2003a; Rencic, 2011; Thammasitboon & Cutrer, 2013).
Feedback	Focus feedback on the thinking processes rather than solely on the accuracy of diagnostic outcomes.
Supported practice	
Support	Provide prompt, clear feedback focusing on students' underlying reasoning. Remediate inaccurate assumptions. Identify where students focused on less relevant information. Identify and remediate knowledge deficits. Encourage early hypothesis generation. Help students determine when they need more information. Ensure students have adequate time to think through the process (Pelaccia, Tardif, Triby, & Charlin, 2011).
Reflection	Encourage students to write down evidence supporting and not supporting hypotheses, and expected symptoms that were not present. Encourage students to list expected symptoms that were not present. Encourage students to list alternative hypotheses and repeat the steps. List hypotheses in order of strength (Mamede et al., 2012).

reasoning. While raising awareness about their thinking errors will help students to discern when to engage deductive reasoning. Finally, both providing students with the time needed to process information and creating simulations for complex cases that are rare in supported practice but are likely to trip them up, support the acquisition of clinical reasoning skills (Moulton et al., 2007; Rencic, 2011). For example, an initial meeting with a child with poor eye contact and a concern for when his mother would return might suggest a diagnosis of Autism to a school psychologist. However, other data may not fit with that hypothesis. An overreliance on inductive reasoning may lead to an inappropriate diagnosis of Autism. On the other hand, if the school psychologist only focused on the low language score without considering the child's level of inattention due to anxiety about his mother's absence and the fact that their home was recently burgled, the school psychologist may inaccurately conclude that he has a language disorder or an anxiety disorder.

Supported Practice

Supported practice (i.e., practica and internships) also promotes the transition from mainly deductive reasoning to effectively utilizing both types of reasoning. During feedback, prompting students to explicitly think through the processes underlying their initial intuitive responses is helpful for several reasons. It provides an opportunity for supervisors to point out and remediate inaccurate assumptions, to recognize where students focused on less relevant information, to identify knowledge deficits, to encourage students to make hypotheses early, to explain how they arrived at hypotheses, and to help students determine when additional information is needed (Pelaccia, Tardif, Triby, & Charlin, 2011).

Mamede et al. (2012) described a reflective process to improve diagnostic skills in medical students. Students wrote down the evidence supporting and opposing their hypothesized diagnosis as well as expected symptoms that were not present. Students then listed other possible hypotheses and repeated the previous steps for alternative hypotheses. Finally, the students listed the hypotheses in order of the strength of the supporting data to come to a final diagnostic conclusion. Throughout this process, instructors should encourage graduate students to consider several hypotheses for every child they assess, testing each one, looking both for evidence supporting and disconfirming each hypothesis.

Avoiding Thinking Errors

The empirical support for specific strategies to reduce thinking errors in clinical reasoning is limited; however, there are some general guidelines and suggestions. Awareness of thinking errors and their impact on reasoning is an important first step in minimizing their impact. We can increase reflective awareness of our susceptibility to thinking errors, including states that impact our reasoning (e.g., fatigue, hunger, stress, time constraints, etc.). Reflectiveness can also promote intentionally slowing down during diagnostic decision-making. These steps may decrease the impact of blind spots by acknowledging our fallibility as human decision makers. Second, considering alternative hypotheses through looking for disconfirming evidence, seeking out advice from peers with different thoughts, or consulting with specialists may reveal the importance of information we have overlooked. Third, having a structured process for collecting and organizing data, which includes searching out disconfirming data and systematically testing multiple hypotheses may decrease thinking errors related to emotional attachment to one hypothesis and increase the likelihood that one will consider the most parsimonious diagnosis or educational classification (Croskerry, 2003a; Croskerry, Singhal, & Mamede, 2013; Pelaccia et al., 2011). Fourth, quantifying data using multiple sources, while attending to base rates, will strengthen confidence in the efficacy of diagnostic conclusions (Lilienfeld et al., 2012).

Summary and Conclusion

The practice of school psychology and medicine differ in substantive ways; however, there are parallels in the clinical reasoning process. Clinicians in both professions are subject to cognitive limitations that interfere with effectively monitoring application of heuristics. School psychologists need to be aware of potential thinking errors that can lead them astray during assessments. Tallent (1993) argued that many of the complaints about poorly written reports stem from weak diagnostic skills rather than poor writing skills per se; consequently, increased clinical reasoning skills and attention to thinking errors, may result in more meaningful psychoeducational reports in which clinicians clearly delineate their clinical reasoning to substantiate their diagnostic conclusions. Within the current psychology literature, however, prevalence of specific thinking errors is unknown.

Even less is known about best practices in teaching clinical reasoning in school psychology. Additional research is needed to determine how best to teach and apply the process of clinical reasoning and to minimize bias in school psychology assessment. We have listed some strategies for both teaching clinical reasoning and combating thinking errors from medical literature, but few of these strategies have been researched in the context of school psychology practice. By identifying ways school psychologists can incorporate clinical reasoning and awareness of thinking errors into their practice, we aim to increase intentional application of clinical reasoning and, thus, the utility of assessment reports and, ultimately, positive outcomes for students.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

Aldeman, H. S., & Taylor, L. (1979). Initial psychoeducational assessment and related consultation. *Learning Disability Quarterly*, *2*, 52-64.

Balla, J. I., Heneghan, C., Glasziou, P., Thompson, M., & Balla, M. E. (2009). A model for reflection for good clinical practice. *Journal of Evaluation in Clinical Practice*, *15*, 964-969.

Berner, E. S., & Graber, M. J. (2008). Overconfidence as a cause of diagnostic error in medicine. *The American Journal of Medicine*, *121*, S2-S23. doi:10.1016/j.amjmed.2008.01.001

Bordage, G. (1998). Why did I miss the diagnosis? Some cognitive explanations and educational implications. *Academic Medicine*, *74*, S138-S143.

Bramlett, R. K., Murphy, J. J., Johnson, J., Wallingsford, L., & Hall, J. D. (2002). Contemporary practices in school psychology: A national survey of roles and referral problems. *Psychology in the Schools*, *39*, 327-335. doi:10.1002/pits.10022

Brammer, R. (1997). Case conceptualization strategies: The relationship between psychologists' experience levels, academic training, and mode of clinical inquiry. *Educational Psychology Review*, *9*, 333-351.

Croskerry, P. (2003a). Cognitive forcing strategies in clinical decision-making. *Annals of Emergency Medicine*, *41*, 110-120. doi:10.1067/mem.2003.22

Croskerry, P. (2003b). The importance of cognitive errors in diagnosis and strategies to minimize them. *Academic Medicine*, *78*, 775-780.

Croskerry, P., Singhal, G., & Mamede, S. (2013). Cognitive debiasing 2: Impediments to and strategies for change. *BMJ Quality & Safety*, *22*, ii65-ii72. doi:10.1136/bmjqs-2012-001713

Davidow, J., & Levinson, E. M. (1993). Heuristic principles and cognitive bias in decision making: Implications for assessment in school psychology. *Psychology in the Schools*, *30*, 351-361.

Ditto, P. H., & Lopez, D. F. (1992). Motivated skepticism: Use of differential decision criteria for preferred and nonpreferred conclusions. *Journal of Personality and Social Psychology*, *63*, 568-584.

Dumont, F. (1993). Inferential heuristics in clinical problem formulation: Selective review of their strengths and weaknesses. *Professional Psychology: Research and Practice*, *24*, 196-205.

Elstein, A. S., & Schwarz, A. (2002). Clinical problem solving and diagnostic decision making: Selective review of the cognitive literature. *British Medical Journal*, *324*, 729-732.

Eva, K. W., Hatala, R. M., LeBlanc, V. R., & Brooks, L. R. (2007). Teaching from the clinical reasoning literature: Combined reasoning strategies help novice diagnosticians overcome misleading information. *Medical Education*, *41*, 1152-1158.

Fagley, N. S., Miller, P. M., & Jones, R. N. (1999). The effect of positive or negative frame on the choices of students in school psychology and educational administration. *School Psychology Quarterly*, *14*, 148-162.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.

Garb, H. N. (2005). Clinical judgment and decision making. *Annual Review of Clinical Psychology*, *1*, 67-89. doi:10.1146/annurev.clinpsy.1.102803.143810

Graber, M. L., Franklin, N., & Gordon, R. (2005). Diagnostic error in internal medicine. *Archives of Internal Medicine*, *165*, 1493-1499.

Gruppen, L. D., Wolf, F. M., & Billi, J. E. (1991). Information gathering and integration as sources of error in diagnostic decision making. *Medical Decision Making*, *11*, 233-239. doi:10.1177/0272989X9101100401

Kahneman, D. (2003). A perspective on judgment and choice. *American Psychologist*, *58*, 697-720.

Kassirer, J. P., Wong, J., & Kopelman, R. (2010). *Learning clinical reasoning* (2nd ed.). Baltimore, MD: Lippincott, Williams & Wilkins.

Kennedy, M. L., Willis, W. G., & Faust, D. (1997). The base-rate fallacy in school psychology. *Journal of Psychoeducational Assessment*, *15*, 292-307.

Lilienfeld, S. O., Ammirati, R., & David, M. (2012). Distinguishing science from pseudoscience in school psychology: Science and scientific thinking as safeguards against human error. *Journal of School Psychology*, *50*, 7-36. doi:10.1016/j.jsp.2011.09.006

Lingman, R., Hunt, L., Golding, J., Jongmans, M., & Emond, A. (2009). Prevalence of developmental coordination disorder using the DSM-IV at 7 years of age: A UK population-based study. *Pediatrics*, *123*, e693-e700. doi:10.1542/peds.2008-1770

Mamede, S., van Gog, T., Moura, A. S., de Faria, R., Peixoto, J. M., Rikers, R., . . .Schmide, H. G. (2012). Reflection as a strategy to foster medical students' acquisition of diagnostic competence. *Medical Education*, *46*, 464-472. doi:10.1111/j.1365-2923.2012.04217.x

McDermott, P. A. (1981). Sources of error in the psychoeducational diagnosis of children. *Journal of School Psychology*, *19*, 31-44.

Moulton, C. E., Regehr, G., Mylopoulos, M., & MacRae, H. (2007). Slowing down when you should: A new model of expert judgment. *Academic Medicine, 82*(10 Suppl.), S109-S116.

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *A Review of General Psychology*, *2*, 175-220.

Norman, G. R. (2009). Dual processing and diagnostic errors. *Advances in Health Science Education*, *14*, 37-49. doi:10.1007/s10459-009-9179-x

Norman, G. R., & Eva, K. W. (2010). Diagnostic error and clinical reasoning. *Medical Education*, *44*, 94-100.

Pelaccia, T., Tardif, J., Triby, E., & Charlin, B. (2011). An analysis of clinical reasoning through a recent and comprehensive approach: The dual-process theory. *Medical Education Online*, *16*, 5890-5898. doi:10.3402/meo.v16i0.5890

Rencic, J. (2011). Twelve tips for teaching expertise in clinical reasoning. *Medical Teacher*, *33*, 887-892.

Tallent, N. (1993). *Psychological report writing* (4th ed.). Englewood Cliffs, NJ: Prentice Hall.

Thammasitboon, S., & Cutrer, W. B. (2013). Diagnostic decision-making and strategies to improve diagnosis. *Current Problems in Pediatric and Adolescent Health Care*, *43*, 232-241.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*, 453-458.

Vertue, F. M., & Haig, B. D. (2008). An abductive perspective on clinical reasoning and case formulation. *Journal of Clinical Psychology*, *64*, 1046-1068. doi:10.1002/jclp.20504

Wolf, F. M., Gruppen, L. D., & Billi, J. E. (1988). Use of the competing-hypothesis heuristic to reduce "pseudodiagnosticity." *Journal of Medical Education*, *63*, 548-554.