International Journal of Nursing Studies 89 (2019) 8–13

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

Apophenia, unconscious bias and reflexivity in nursing qualitative research

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ARTICLE INFO

Article history:
Received 16 March 2018
Received in revised form 20 September 2018
Accepted 21 September 2018

Keywords:
Apophenia
Cognitive bias
Pattern recognition
Patternicity
Qualitative research
Unconscious bias

ABSTRACT

Nurses routinely engage in pattern recognition and interpretation in qualitative research and clinical practice. However, they risk spontaneously perceiving patterns among things that are not meaningfully related. Although all people are prone to this cognitive bias of "apophenia", nurses may be at increased risk because they commonly produce or at least use qualitative research that can be highly interpretive. Qualitative researchers have been silent on the risk of apophenia and hence on exploring how attention to apophenia could help to indicate and manage such unconscious biases. Therefore this conceptual paper suggests how, in disciplines like nursing, researchers could attend to and use reflexivity on signs of possible apophenia to help bring unconscious biases to awareness. Within safe communities of professional practice, the researchers could cooperate with trusted peers to reflect on how and why they may each perceive patterned phenomena from different perspectives. If one reason is that the researchers, for example, appear to exhibit particular unconscious biases, then dialogue could help them to become aware of, and reflect on the biases. This expansion of researchers' consciousness of bias could inform the management of apophenia and enhance the quality of qualitative research and modern nursing practice.

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What is already known about the topic?

- Patterns are ubiquitous in the world. All people look for them to create a comforting sense of order in the midst of disorder.
- Through making cognitive errors in research and praxis, nurses may consciously but spontaneously recognize patterns that do not meaningfully exist (apophenia).
- Qualitative researchers in nursing are encouraged to focus less on bias than on transparency and reflexivity.

What this paper adds

- Pattern recognition in qualitative research by nurses may be especially prone to apophenia.
- Increasing awareness of apophenia could be a resource that qualitative nurse researchers can use reflexively with peers to reduce this cognitive bias and bring unconscious bias to awareness.
- Dialogue including intersubjective reflection within safe communities of professional practice could make unconscious bias conscious in researchers and others, and enhance their qualitative research and nursing practice.

1. Introduction

Nursing practice seeks to find or construct order and meaning from dynamic and emergent experience of complexity. For example, in many health systems the new role of "nurse health coach" supports patients with diverse backgrounds to live with long-term conditions in patterned ways that meet increasingly complex and ambiguous health needs (Mitchell et al., 2013; Lindberg et al., 2008). However, nurses can err in recognizing these patterns. One reason could be the presence of cognitive biases. These biases have been studied less widely in nursing than medicine (Schultz and Baker, 2017) and, when looking at error, nurse researchers have tended to focus on how deliberate judgements can err. However, with particular but not exclusive

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https://doi.org/10.1016/j.ijnurstu.2018.09.013
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reference to nursing, I wish to consider a seldom-discussed form of cognitive bias in pattern recognition, known as "apophenia".

Apophenia occurs when meaning is perceived in unrelated phenomena, typically outside conscious awareness. I am interested in exploring how nurses, among other health practitioners, might identify and manage this bias in qualitative research. Nursing is relevant here because, as a highly interpretive discipline, it commonly produces and uses qualitative research that is prone to apophenia. This liability to apophenia arises because, in identifying and giving meaning to patterns whose use may enhance nursing practice, qualitative research makes subjective judgments about the meaning of social action from samples whose small size reduces the ability to maximize variation among participants.

I wish to consider how apophenia may be identified and used to bring unconscious bias to awareness. Despite interest in interpretive approaches like intuitive inquiry (Janesick, 2001; Wertz et al., 2011), qualitative nurse researchers have been silent on unconscious bias in pattern recognition and apophenia. Instead they have focused on "personal knowledge" (Carper, 1978; Averill and Clements, 2007) or "tacit knowledge" (Polanyi, 1966) and have tended to refer to "bias" as a general, undifferentiated concept without delineating the standard against which to define it. The latter practice is evident in generic reporting guidelines for qualitative research, such as the COREQ (COnsolidated criteria for REporting Qualitative research) Checklist (Tong et al., 2007). Some other statements, such as the SPQR (Standards for Reporting Qualitative Research), emphasize researcher reflexivity rather than bias (O'Brien et al., 2014), and a recent editorial by a nurse educator (Galdas, 2017) likewise encourages qualitative researchers to focus less on bias than transparency and reflexivity. However, this advice could create a false dichotomy. Researcher bias could be unconscious bias, elude direct reflection but be made conscious and manageable through researchers becoming aware of and reflecting on cognitive biases such as apophenia.

This pathway to an expansion of consciousness could increase the self-knowledge of the researchers and reduce effects of their negative unconscious bias on the "trustworthiness" of their qualitative research. Here I am referring most simply to the quality of this research and the extent to which, in nursing, it can generate practice-relevant findings that warrant serious, critical attention. Bringing unconscious bias to awareness could make the research more credible, for example, by helping qualitative researchers to understand themselves and alternative perspectives in rigorously gathering and analyzing data (Lincoln and Guba, 1985; Devers, 1999). Therefore, after defining the meaning of "patterns" and discussing approaches to recognize them, I will suggest how qualitative nursing researchers are prone to commit the cognitive error of "apophenia" but could seek to manage it through reflexivity in ways that may enhance their research and the delivery of nursing care.

2. Patterns indicate regularities

I wish to define "patterns" as mental pictures and abstract images of similar or predictably different elements that group together. Emerging from heterogeneity, the groups comprise different elements that resemble or connect with each other as ordered systems of appearance. Patterns bring together some elements, on the basis of their regularity and internal coherence, in a common category. Whether stable or varying by circumstance (Hatch, 2002), the patterns are intended to help people filter out the information least relevant to them; predict the future, feel in increased control, and manage uncertainty and error.

2.1. Patterns and themes

Patterns play a role in the methods that nurses, among others, commonly use to conduct research processes such as qualitative data analysis. The methods oriented to recognizing and analyzing patterns in qualitative research include forms of constant comparative analysis such as content analysis and thematic analysis, in study designs like interpretive description and grounded theory. Some of the qualitative researchers who write about the methodology of thematic analysis, such as Braun and Clarke (2006), treat patterns and themes as synonymous. However, Patton (2002) suggests that while no firm distinction can be made between the meanings of these terms, patterns describe configurations of content whereas themes are more categorical or topical, and abstract in meaning. For example, a pattern may characterize how particular types of patients access counselling for anxiety, and contribute to developing a theme of managing anxiety. The theme may reflect the importance of what is observed rather than underlying regularities in the data.

In these terms, not all patterns (or categories) are themes (Morse, 2008). Patterns may also be recognizable beyond themes, for example in unifying themes into a "framework" (Thomas, 2006) or "pattern theories" (Cresswell, 2003). Moreover, the need to recognize and reflect on patterns and error in pattern recognition extends beyond thematic analysis. Even though I will focus on the analysis stage of qualitative research, patterns integrate disconnected observations across the whole research process, as evident in decisions about which questions to study, how to address them and how to interpret, present and use the findings.

3. Pattern recognition

Patterns are ubiquitous in nature and social life. Human beings have evolved to excel at recognizing them and explaining their meaning and significance. They may notice patterns from observing core consistencies in the frequency or importance of particular ideas. People are believed to identify patterns by matching the information they encounter, and find stimulating, against information available in their memory. They are assumed to match what they perceive against a stored template (mini-copy of certain patterns), a prototype (basic features of one pattern) or defining features of a pattern (rather than the whole pattern, as characterizes template analysis and prototype analysis) (Pi et al., 2008). These approaches typically take place automatically, fast and unconsciously via intuition (Margolis, 1987).

Hence, pattern recognition is not ordinarily noticed, although it may overlap with thinking that is deliberate, slow and conscious (dual process theory of thinking) (Kahneman, 2003). Without using the word "patterns", Kahneman referred to how intuitive "representations" can inform judgments, for example by nurses (Benner et al., 1996). This use of intuition increases as nurses accumulate experience and transition from novices to experts (Benner, 1984). Paley et al. (2007) observed that in nursing, "the different patterns of knowing have equal status and weight", whereas evidence-based medicine privileges rule-based cognition and empirical testing. On balance, intuition can be an advanced skill associated with creativity, yet lead to misrecognizing patterns and to bias.

4. Pattern recognition error

Patterns can be misrecognized in two broad senses. From a realist perspective, error is the difference between the pattern recognized and a mind-independent and unknown reality or truth. The second sense of error, from a social constructionist perspective, is deviance between the pattern that a person recognizes and

its historically and socially agreed meanings. However, error itself can be considered socially constructed "because the underlying rules that define error are themselves part of any organic and changing system" (Anson, 2000). Either way, there is a risk of recognizing patterns that do not exist beyond one's own mind. As Fine (1973) observed, "Too keen an eye for pattern will find it anywhere." People risk perceiving meaningful patterns in intrinsically meaningless coincidences and random stimuli (withstanding the riposte that random variations are patterns too). More simply, the natural need of people to make connections between things can lead to bias.

4.1. Bias

Integral to thinking, "bias" indicates a systematic tendency or inclination of people to experience something from limited knowledge in a particular way (Gadamer, 1977). Therefore, bias can obscure or illuminate understanding of this experience and no one is bias free. Within the judgment and decision-making literature, "cognitive bias" is a type of bias that generally refers to systematic patterns of thinking that deviate from a standard of rationality and deliberately invoke information-processing shortcuts. These short cuts can save time. However, when used without sufficient attention they can also produce misjudgements, for example by prompting people to see and value highly what they expect or what fits their pre-existing beliefs. Cognitive bias is not usually available to consciousness but when it is brought to people's attention, they may be able to reflect on its effects, "check" its risk of undermining their reasoning, and self-censor to manage the bias. "Unconscious bias" is a particular type of cognitive bias. It is a habit of thought in which social categories such as race or gender unduly influence judgment-making in a manner that lies outside the awareness of the person making the judgment. Whether the standard that they breach is rationality or something else, such as equity, can be unclear. An unconscious bias is most likely held about a particular out-group with which the person does not identify. Instinctual or learnt, the bias does not necessarily align with people's declared beliefs, and tends to favour their in-group.

4.2. Apophenia

I am interested in how the cognitive bias of apophenia can characterize qualitative research by nurses in particular, and shed light on unconscious bias. Complementing the notion that people may pattern events by meaning rather than cause and effect (Jung, 1985), the concept of apophenia (which comes from the Greek, "apo", away and "phænein", to show) refers to an unmotivated and spontaneous tendency of the mind, in moments of mental clarity, to make sense out of nonsense. People are not usually conscious of inventing patterns not present in the data, although they may become aware of exercising this cognitive bias. Known also as "patternicity" (Shermer, 2008), apophenia resembles other cognitive biases including the confirmation bias and clustering illusion, and is widely recognized in a mild form to be a normal and common feature of human functioning in the general population.

The historical use of psychoanalytic approaches like the Rorschach test illuminates the role of unconscious bias in apophenia. This test requires people to state what different inkblots look like to them, while knowing that these images are only inkblots, so that an analyst can then use their perceptions to diagnose unconscious states. Whether the test can diagnose contents of the unconscious mind has long been controversial (Meyer et al., 2017; Mihura et al., 2013) but it might at least help to indicate "how" people process information in ways that project their unconscious mind onto what they perceive. The same insight seems associated with approaches like play therapy, and "parapraxis" as a slip that reveals something fundamental about disavowed parts of people's unconscious selves.

5. Qualitative nursing research

Goldfarb and King (2016) coined the concept of "scientific apophenia", which they defined as a "tendency to find and publish evidence of order where none exists". They applied this concept to strategic management research, and apophenia similarly characterizes qualitative research. For example, as a source of emergent knowledge, qualitative analysis engages the"researcher-as-research instrument" in constructing meaning from disorder at different degrees of closeness to what is typically "the softest of soft data" . . . [including] peoples' recollections" (Morse, 2009). From different qualitative traditions, researchers may produce shared and contested meanings from patterns they look for, and seek to understand, in frequently complex and unpredictable human action and emotions (Newen et al., 2015).

Different interpretations of patterns may be equally defensible if knowledge is constructed rather than discovered, but the differences could also indicate biases like apophenia. In addition, small qualitative studies increase the risk of encountering unrelated or accidental items, while pattern recognition software and techniques, such as matrix display and pattern-based autocoding, help researchers to notice patterns in qualitative data. While nurses are at least as prone as the general population to apophenia (FitzGerald and Hurst, 2017), qualitative nurse researchers may be at increased risk for two sets of reasons.

First, nurses that conduct studies in their own clinical settings may be deeply familiar with their subject of inquiry. This familiarity can prompt them to expect to recognize particular patterns and ignore, or not notice or devalue, contrary possibilities (Rappert, 2015). Contemporary nursing research has also been documented to exhibit related cognitive biases such as selecting predominantly female samples (Polit and Beck, 2009). Secondly, as frequently strong qualitative researchers, nurses often go beyond basic descriptions whose meaning is readily agreed. They identify deep meanings that draw on, and are sometimes inseparable from, their own subjective experiences. These conditions increase their risk of over-interpreting findings (Sandelowski and Barroso, 2002). Thus I wish to consider how, as a cognitive bias toward over-interpretation, the risk of apophenia typically indicates unconscious bias that reflexivity and dialogue might help to reveal and manage.

6. Reflexivity

In discussing reflexivity, I wish to emphasize "methodological reflexivity", which refers to how researchers could develop self-awareness of holding cognitive biases of which they might not be conscious. Although people "do not know what they do not know", they can know things without being conscious of knowing them ("unknown knowns") and bring to consciousness both this knowledge and what they do not yet know about how they tend to see the world. Meeting these challenges is suggested to require the kind of methodological reflexivity illustrated by the visual metaphor of a "window-mirror" (Buetow and Elwyn, 2008).

Qualitative researchers and peer reviewers could look in this mirror to notice differences between how they each view, and are perceived to view, ambiguous or uncertain patterns, and then seek to account for the differences. Born of humble curiosity, two processes are evident here: introspection and intersubjective reflection (Finlay, 2002). Introspection entails self-reflection as well as researchers imagining standing outside themselves to "see" themselves as different others do (Hunt and Sampson, 2006).

Intersubjective reflection widens this view. It introduces a sceptical peer perspective that may include dialogue around signs of particular unconscious biases. There is scope then to triangulate the shared perceptions, whether real or imagined, by researchers and peers within a single study. This reflexive triangulation would itself be prone to cognitive bias. However, "meta-reflexivity" (reflexivity about the presence or absence of reflexivity) could minimize this risk. The reflexive nature of qualitative research and nursing equips practitioners to engage with these issues, and the following discussion applies this conceptualization to an example of published theory development from nursing qualitative research.

Within a tradition of critical qualitative inquiry, Van Herk et al. (2011) identified racism and sexism as barriers to Aboriginal women accessing nursing care in Canada. The authors' entry into the study with a "postcolonial, feminist perspective" predisposed them to cognitive bias in recognizing, in their qualitative data, patterned forms of social oppression of Aboriginal women by nurses who were deemed to be subject to the "hegemony of the white, middle class perspective". The authors were conscious of this bias because they deliberately adopted their explicit frame of critical orientation *a priori.* As "a form of self-consciousness" that can guide emancipatory action (Macey, 2001), their application of critical theory uses "intersectionality" to structure a dialogic space for reflection. However, despite using their critical orientation and study findings to call on "everyone [else] to reflect on his or her positioning . . . and the ways in which each one of us colludes in oppression", the authors themselves did not clearly practise this same kind of reflexive assessment. They did not discuss their own proneness to interpret as gendered racism the barriers identified to Aboriginal women accessing care, and on the implications for their qualitative research.

The authors could and should have reflected explicitly both on their conscious bias in favour of critical theory *and* on their conscious *or* unconscious bias in not clearly demonstrating self-reflexivity. Sceptical peer review could have alerted them to this need for meta-reflexivity in order to interrogate explicitly their own positionality along with other possible biases. For example, looking in from the outside, I noticed that despite expressing concern for social justice, the authors lacked tolerance for ideological diversity. They did not demonstrate any consideration: of the conditions under which people who are oppressed share responsibility to help liberate themselves, according to their own capabilities and opportunities; of alternative explanations for gendered racism, such as self-similarity bias, affinity groups and novelty aversion; or of their own power to oppress nurses and nursing by making potentially false and stigmatizing accusations of racism. Such omissions undermine the authors' conclusion of gendered racism. However, since I perceive their research differently from how they view it, and need to practice what I preach, I need to reflect on how my own bias has affected my critique and been influenced by their research.

I found the research discomforting, not because of its radicalism but rather because the "tunnel vision" of its meta-narrative seemed to constrict my own visual field. Therefore, since I see myself as socially liberal, I considered that unconsciously I might not be progressive enough in recognizing opportunities to loosen social hierarchies that are not natural. My peers might also notice my "blind spots", notwithstanding that I have long been aware of needing to try to be balanced and open-minded in order to learn; grow; and use my lack of certainty to maintain a questioning attitude, nurture safety and protect against excess (Buetow, 2011).

I should also acknowledge current uncertainty over the conditions under which unconscious bias, even when it distorts pattern recognition, alters patterns of behaviour (Oswald et al., 2013), for example by nurses (Haider et al., 2015). The full potential of making unconscious bias conscious is yet to be determined (Blanton and Jaccard, 2015). However, bringing unconscious bias to consciousness could boost nurses' "personal knowledge" by increasing their self-awareness and self-understanding (Carper, 1978). This development could help them to reflect critically on how "who they are" embodies particular attitudes and influences their autonomy (Young, 1976). Increased self-awareness could also enable them to make this bias transparent; to "unknow" (Munhall, 1993), unlearn and replace it with new associations of ideas (Dasgupta, 2013); and to consider implications for nursing practice.

Moreover, the opportunity for nurses to expand consciousness of their biases resonates with two concepts. The first is Somerville (2007) concept of postmodern emergence in research. Its qualities of "wondering" and of "becoming" across liminal spaces (including perceptions that differ between "self" and "other") are constitutionally relevant to researchers generating new knowledge and understanding. The second, related concept is "health as expanding consciousness" (Newman, 2008) in order to enhance nurses' informational capacity to interact with their environment. This interaction involves "a process of becoming more of oneself, of finding greater meaning in life, and of reaching new heights of connectedness with other people and the world" (Newman, 2008). These ideas resonate with Jung's (Jung and Jaffe, 1961) belief that, "Man's task is . . . to become conscious of the contents that press upward from the unconscious." However, meeting this challenge and associated opportunities to reduce unconscious bias requires nurse researchers, among others, to look for and reflect on their cognitive biases like apophenia. This reflection could point to other cognitive biases like the "introspection illusion", and to unconscious biases.

This stimulus to reflexivity is especially important as approaches to assessing unconscious bias evolve. Stimulated by the development of dual-process theories that contrast conscious and unconscious thinking, the move from explicit to implicit attitude assessment has been a significant development in the attitude literature. Reflexivity complements this development, even as debate continues over the psychometric qualities and usefulness of measures like the implicit-association test (IAT) (Blanton and Jaccard, 2015), which has become widely applied and examined in laboratory studies and online testing hubs (Greenwald et al., 1998). The IAT is not a diagnostic test but it is another way of attempting to bring to the threshold of awareness an interpretation of unconscious bias, for example among nurse researchers, toward a specific group or target concept. They might then align this interpretation with their conscious beliefs through reflection and discussion.

6.1. Dialogue

Reflexivity can continue, and be communicated, through dialogue that, as a fluctuating multivocal process, requires analysis by, feedback from, and discussion with trusted peers. The feedback would expand the practice of sceptical peer review, as a technique for intersubjective reflection (as discussed above) and increasing the trustworthiness of qualitative research findings (Devers, 1999). However, since the dialogue could feel challenging and potentially threatening, it must be structured and managed to feel safe and egalitarian. Realizing this commitment may require setting up communities of professional practice wherein participants can meet together to "turn on the lights" (Pyrko et al., 2017).

Dialogic illumination could include bringing indications of unconscious bias to conscious awareness and appraisal. With or without reaching agreement that particular unconscious biases may be present, the dialogue could ameliorate how apophenia is reported. The aim here is not to censor what researchers say they

perceive but rather to encourage them to acknowledge uncertainty and moderate their behaviour even if they cannot control any particular bias initiating it (Alderson, 2017). Helpful behaviour could include empathetic practices like "micro-affirmations" (Rowe, 2008) that align with values and goals they endorse through reflection (Whitson and Galinsky, 2008). Other actions could focus on improving conditions, in the environment, conducive to bias in generating and analyzing data. As indicated above, one such condition is prior knowledge of the study phenomenon or setting.

Experienced nurses could have an increased likelihood of perceiving what they have previously encountered or been told about (Skinner, 1953) and expect to find (González-García et al., 2015). Not reviewing all the relevant literature before completing some types of qualitative data analysis, such as classic grounded theory, might reduce their risk of apophenia. However, the literature is only one source of professional knowledge and nurse researchers may be less interested in inductive theorizing than pragmatically advancing nursing praxis. Accordingly, rather than postpone the timing of a literature review, it will usually suffice, or at least be preferable, for the researchers to focus on using reflexivity.

7. Clinical implications

Although my conceptual analysis focuses on qualitative research and requires further development and empirical testing, it is potentially relevant to clinical nursing practice and broader professional domains in nursing such as education and policy. For example, consider the clinical assessment of pain. Tait and Chibnall (2014) compared this inherently subjective experience to a Rorschach test. They stated that, "Like a projective test, providers can project onto patients their attitudes, beliefs, and opinions, making clinical judgments ripe for the influence of stereotyping." Thus, bias has been associated with disparate treatment by clinicians to relieve chronic pain in patients whose race or ethnicity differs from their own (Millard, 2009). However, qualitative research (Washington, 2012) has provided insight into this inequality in ambiguous pain management by nurses. Moreover, sharpened by using or producing qualitative research, reflexivity could include nurses considering how race or ethnicity impacts their judgments. Disavowal of pro-White attitudes would still bring racial stereotypes into consciousness and promote vigilance in avoiding them in everyday practice.

8. Conclusion

Nursing entails and educates for pattern recognition in ways of knowing that include qualitative research (Beck, 2013) and clinical judgment (Endo, 2017; Tanner, 2006; Welk, 2002). However, nurses, among other health practitioners, have tended to disregard the proneness of qualitative research to apophenia. As a consequence, they have been losing an opportunity to use reflexivity with others to expose how signs of this cognitive error can indicate unconscious bias. This waste seems unfortunate because nurses, and especially those involved in qualitative research, are suited to, and familiar with, using reflexivity to manage the reflexive nature of their work. Therefore, this paper has sought to stimulate them to reflect on apophenia with trusted others in communities of professional practice; to use dialogue and intersubjective reflection to become aware of possible unconscious causes of this cognitive bias; and to use this awareness to enhance the trustworthiness of qualitative research. In turn, these developments may help nurses to improve their nursing practice.

Acknowledgments

The author is grateful to the Associate Editor, Dr Chris McLean, and to three reviewers for their patient and helpful suggestions on how to improve this paper.

References

Alderson, N., 2017. Defining agency after implicit bias. Philos. Psychol. 30, 645–656.
Anson, C., 2000. Response and the social construction of error. Assess. Writ. 7, 5–21.
Averill, J.B., Clements, P., 2007. Patterns of knowing as a foundation for action-sensitive pedagogy. Qual. Health Res. 17, 386–399.
Beck, C.T. (Ed.), 2013. Routledge International Handbook of Qualitative Nursing Research. Routledge, London.
Benner, P., 1984. From Novice to Expert: Excellence and Power in Clinical Nursing Practice. Addison-Wesley, Menlo-Park, CA.
Benner, P., Tanner, C., Chesla, C., 1996. Expertise in Nursing Practice: Caring, Clinical Judgment and Ethics. Springer, New York.
Blanton, H., Jaccard, J., 2015. Not so fast: ten challenges to importing implicit attitude measures to media psychology. Media Psychol. 18, 338–369.
Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3, 77–101.
Buetow, S., 2011. The virtue of uncertainty in health care. J. Eval. Clin. Pract. 17, 873–876.
Buetow, S., Elwyn, G., 2008. The window mirror: a new model of the patient-physician relationship. Open Med. 2, E20–25.
Carper, B., 1978. Fundamental patterns of knowinng in nursing. Adv. Nurs. Sci. 1, 13–24.
Cresswell, J., 2003. Research Design: Qualitative, Quantitative and Mixed Methods Approaches. Sage, Thousand Oaks, CA.
Dasgupta, N., 2013. Chapter five–implicit attitudes and beliefs adapt to situations: a decade of research on the malleability of implicit prejudice, stereotypes, and the self-concept. Adv. Exp. Soc. Psychol. 47, 233–279.
Devers, K., 1999. How will we know "good" qualitative research when we see it? Beginning the dialogue in health services research. HSR: Health Serv. Res. 34, 1153–1188.
Endo, E., 2017. Margaret Newman's theory of health as expanding consciousness and a nursing intervention from a unitary perspective. Asia Pac. J. Oncol. Nurs. 4, 50–52.
Fine, T.L., 1973. Theories of Probability: An Examination of Foundations. Academic Press, New York.
Finlay, L., 2002. Negotiating the swamp: the opportunity and challenge of reflexivity in research practice. Qual. Res. 2, 209–230.
FitzGerald, C., Hurst, S., 2017. Implicit bias in healthcare professionals: a systematic review. BMC Med. Ethics 18 (19) doi:http://dx.doi.org/10.1186/s12910-017-0179-8.
Gadamer, H., 1977. The universality of the hermeneutical problem. In: Linge, D. (Ed.), Philosophical Hermeneutics. University of California Press, Berkeley, CA, pp. 3–17.
Galdas, P., 2017. Revisiting bias in qualitative research. Int. J. Qual. Methods 16, 1–2.
Goldfarb, B., King, A.A., 2016. Scientific apophenia in strategic management research: significance tests and mistaken inference. Strateg. Manage. J. 37, 167–176.
González-García, C., et al., 2015. Unconscious biases in task choices depend on conscious expectations. Conscious. Cogn. 37, 44–56.
Greenwald, A.G., McGhee, D.E., Schwartz, J.L., 1998. Measuring individual differences in implicit cognition: the implicit association test. J. Pers. Soc. Psychol. 74, 1464–1480.
Haider, A.H., et al., 2015. Unconscious race and class biases among registered nurses: vignette-based study using implicit association testing. J. Am. Coll. Surg. 220, 1077–1086 e3.
Hatch, J.A., 2002. Doing Qualitative Research in Education Settings. SUNY Press, Albany, New York.
Hunt, C., Sampson, F., 2006. Writing. Self and Reflexivity. Palgrave, Houndmills.
Janesick, V., 2001. Intuition and creativity: a pas de deux for qualitative researchers. Qual. Inq. 7, 531–540.
Jung, C.G., 1985. Synchronicity. An Acausal Connecting Principle. Routledge, East Sussex.
Jung, C.G., Jaffe, A., 1961. Memories, Dreams, Reflections. Random House, New York.
Kahneman, D., 2003. A perspective on judgement and choice. Am. Psychol. 58, 697–720.
Lincoln, Y., Guba, E., 1985. Naturalistic Inquiry. Sage, Beverly Hills, CA.
Lindberg, C., et al., 2008. On the Edge: Nursing in the Age of Complexity. Plexus Press, Bordentown, NJ.
Macey, D., 2001. The Penguin Dictionary of Critical Theory. Penguin Books, London.
Margolis, H., 1987. Patterns, Thinking, and Cognition: A Theory of Judgment. University of Chicago Press, Chicago.
Meyer, G.J., et al., 2017. Psychometric foundations of the Rorschach Performance Assessment System© (R-PAS©), 23-91. In: Erard, R., Evans, B. (Eds.), The Rorschach in Multimethod Forensic Assessment: Conceptual Foundations and Practical Applications. Routledge, New York.
Mihura, J., et al., 2013. The validity of individual Rorschach variables: systematic reviews and meta-analyses of the comprehensive system. Psychol. Bull. 139, 548–605.

Millard, W.B., 2009. Ignoring it isn't an option: racial bias in emergency medicine. Ann. Emerg. Med. 53, A19–23.
Mitchell, G., 2013. Nurs. Res. Pract. doi:http://dx.doi.org/10.1155/2013/238620.
Morse, J., 2008. Confusing categories and themes. Qual. Health Res. 18, 727–728.
Morse, J., 2009. Going beyond your data and other dilemmas of interpretation. Qual. Health Res. 19, 579.
Munhall, P., 1993. Unknowing: toward another pattern of knowing in nursing. Nurs. Outlook 41, 125–128.
Newen, A., et al., 2015. Emotion recognition as pattern recognition: the relevance of perception. Mind Lang. 30, 187–208.
O'Brien, B.C., et al., 2014. Standards for reporting qualitative research: a synthesis of recommendations. Acad. Med. 89, 1245–1251.
Oswald, F.L., et al., 2013. Predicting ethnic and racial discrimination: a meta-analysis of IAT criterion studies. J. Pers. Soc. Psychol. 105, 171–192.
Paley, J., et al., 2007. Nursing's ways of knowing and dual process theories of cognition. J. Adv. Nurs. 60, 692–701.
Patton, M., 2002. Qualitative Research and Evaluation Methods. Sage Publications, Thousand Oaks.
Pi, Y., et al., 2008. Theory of cognitive pattern recognition. In: Yin, P. (Ed.), Pattern Recognition Techniques, Technology and Applications. InTech, Vienna, pp. 433–462.
Polanyi, M., 1966. The Tacit Dimension. Peter Smith, Gloucester.
Polit, D., Beck, C., 2009. International gender bias in nursing research, 2005–2006: a quantitative content analysis. Int. J. Nurs. Stud. 46, 1102–1110.
Pyrko, I., et al., 2017. Thinking together: what makes communities of practice work? Hum. Relat. 70, 389–409.
Rappert, B., 2015. Sensing absence. How to see what isn't there in the study of science and security. In: Balmer, B., Rappert, B. (Eds.), Absence in Science, Security and Policy. From Research Agendas to Global Strategy. Palgrave Macmillan, London, pp. 3–33.
Rowe, M.P., 2008. Micro-affirmations and micro-inequities. J. Int. Ombudsman Assoc. 1, 45–48.
Sandelowski, M., Barroso, J., 2002. Finding the findings in qualitative studies. J. Nurs. Scholarsh. 34, 213–219.
Schultz, P., Baker, J., 2017. Teaching strategies to increase nursing student acceptance and management of unconscious bias. J. Nurs. Educ. 56, 692–696.
Shermer, M., 2008. Patternicity: finding meaningful patterns in meaningless noise. Sci. Am. 299, 48.
Skinner, B.F., 1953. Science and Human Behavior. Free Press, New York.
Somerville, M., 2007. Postmodern emergence. Int. J. Qual. Stud. Educ. 20, 225–243.
Tait, R.C., Chibnall, J.T., 2014. Racial/ethnic disparities in the assessment and treatment of pain: psychosocial perspectives. Am. Psychol. 69, 131–141.
Tanner, C., 2006. Thinking like a nurse: a research-based model of clinical judgment in nursing. J. Nurs. Educ. 45, 204–211.
Thomas, D., 2006. A general inductive approach for analyzing qualitative evaluation data. Am. J. Eval. 27, 1–10.
Tong, A., et al., 2007. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int. J. Qual. Health Care 19, 349–357.
Van Herk, K., et al., 2011. Examining our privileges and oppressions: incorporating an intersectionality paradigm into nursing. Nurs. Inq. 18, 29–39.
Washington, D., 2012. Social Cognition and the Impact of Race/Ethnicity on Clinical Decision Making. PhD Thesis. Boston College, Boston. http://hdl.handle.net/2345/3149.
Welk, D.S., 2002. Designing clinical examples to promote pattern recognition: nursing education-based research and practical applications. J. Nurs. Educ. 41, 53–60.
Wertz, F., et al., 2011. Five Ways of Doing Qualitative Analysis: Phenomenological Psychology, Grounded Theory, Discourse Analysis, Narrative Research and Intuitive Inquiry. Guilford Press, London.
Whitson, J., Galinsky, A., 2008. Lacking control increases illusory pattern perception. Sci. Technol. Stud. 322, 115–117.
Young, A., 1976. The Reflexive Universe: Evolution of Consciousness. Robert Briggs Associates, San Francisco.