Abductive reasoning and qualitative research

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Abstract
Abduction, deduction and induction describe forms of reasoning. Deduction and induction are discussed in the nursing literature. However, abduction has been largely neglected by nurse scholars. In this paper it is proposed that abduction may play a part in qualitative data analysis – specifically, in the identification of themes, codes, and categories. Abduction is not, in research, restricted to or associated with any particular methodology. Nevertheless, situating abduction in qualitative research facilitates the identification of three interlinked issues. First, it is suggested that abductively derived claims require support from deductive and inductively sourced evidence if they are to ‘hold’ and, yet, in qualitative research this is clearly problematic. Second, difficulties in choosing between alternative plausible hypotheses (i.e. concerning theme, code, and category description) are explored through an examination of the ‘generality problem’. Third, the role of background and auxiliary theories in adjudicating between hypothesis options is discussed. It is argued that if qualitative researchers utilize abductive inference in the manner suggested, then the peculiarly fallible nature of abduction must be acknowledged and, in consequence, the action guiding potential of qualitative research findings is compromised.

Keywords: nursing research, qualitative research, applied research, explanation, abductive reasoning.

Introduction
Abduction is defined more fully within the body of this essay; however, put simply it can be envisaged as the creative, imaginative or insightful moment in which understanding is grasped – or is thought to be grasped. Described in this way abduction is both an everyday event and, it will be argued, a problematic one. Thus as a commonplace happening I see my wife’s car in the drive and I abduct that she has arrived home before me. This form of reasoning often generates ‘correct’ conclusions. However, as Peirce (1998a [1903]) notes, while the ‘abductive suggestion
comes to us like a flash. It is an act of . . . extremely fallible insight’ (p. 227) and, e.g. it might also be that having been given a lift into work today, the presence of a car in the drive does not signal my wife’s return.

Here it is proposed that, while abductive reasoning informs nursing and research practice, interesting questions are raised for qualitative researchers and qualitative research consumers (readers) when abduction is considered. This paper does not suggest that abduction is an inappropriate or unsuitable form of inference to deploy in qualitative or other forms of investigation (it may be indispensable). Nor is it proposed that alternative forms of logic or inference are absent from the interpretive process. Rather, it is suggested that if abduction is granted a role in qualitative data analysis then the peculiarly weak nature of this form of inference must be recognized. This is not an attack upon qualitative research; it is an exploration of the problems inherent in belief formation and belief justification when, in qualitative studies, abduction occurs.

Abduction in nursing texts

Abductive inference plays a part in logic, reasoning, and belief formation. It is, however, a form of inference that is underexplored; it is largely ignored, by nurses.

An all-text e-search conducted on 17 November 2011 of the database Cumulative Index to Nursing and Allied Health Literature (CINAHL) located 89 hits for the search phrase inductive reasoning, 87 hits for the search phrase deductive reasoning and just 5 hits for the phrase abductive reasoning. Two of the five located papers on abductive reasoning (Richardson & Kramer, 2006; Haig, 2008) were in journals that do not specifically target nursing or health and, for that reason, they may be unfamiliar to nurses (i.e. Journal of Theory Construction and Testing and Qualitative Research). Of the remaining three papers, two are by Råholm (2010a, 2010b) and recent publication probably means that they have not yet been ‘absorbed’ by the profession; the third, by Gordon et al. (2005), misconstrues abduction (see below).

Papers discussing abduction will have been missed by this search and, had this review gone beyond the nursing literature, then a very large number of sources would have been located. Nonetheless, the small number of hits generated from CINAHL might indicate that nurse researchers and scholars are relatively indifferent towards the concept and this indifference appears to be replicated in nursing research textbooks. Thus, reference lists in Bowling (2009), Parahoo (2006), Polit & Beck (2006), and Cormack (2000) identify entries for induction and deduction but not abduction. Davies (2007) does note abduction. However, the topic merits only a few lines in a glossary at the close of that book and it is not possible to capture the term’s meaning from the description given. Therefore, while the non-nursing literature on abduction may be being accessed this is not evidenced and it is therefore concluded that, despite this review’s admittedly partial and limited character, nurse researcher/scholars have not, to date, demonstrated in their writings a substantive interest in this topic.

Does this lack of interest matter?

Lawson (2010) states that ‘how scientists reason and argue . . . has long been viewed as a critical component of scientific literacy’ (p. 336). Nurses interest themselves in a wide range of human activities and this interest involves or includes using science to understand action/behaviour. Scientific literacy entails awareness of or engagement with the processes of belief formation and belief justification. Abductive inference is a part of reasoning and abduction thus underpins aspects of belief formation/ justification and, in consequence, action/behaviour.

Examining the inferential forms that logic or reasoning takes therefore has real import. Indeed, just as ‘unpicking’ the nature of argument potentially allows the robustness of argument to be enhanced (by permitting weak elements to be strengthened or eliminated) so acknowledging the role of abductive reasoning in nursing practice and research can benefit practice and research insofar as this acknowledgment enables the beliefs that we act upon to be informed by more transparent and defendable logic and reasoning.

This paper offers both a supportive codicil and challenge to authors such as Råholm (2010a) who
have sought to bring the concept of abduction to a nursing audience. It is supportive insofar as it recognizes that benefit should accrue from acknowledging the role played by abductive reasoning in belief formation and belief justification. It challenges by emphasizing that the case ‘for’ abduction must not be overstated and, perhaps, Råholm’s (2010a) recent paper (in this journal) underestimates the problems accompanying use of this form of inference. Here it is suggested that, even more than Råholm (2010a) allows, abductive inference must be employed judiciously for, while abduction can play a ‘role in the discovery of processes of [nursing] theory development’ (p. 268) this form of reasoning is especially vulnerable to challenge and, in consequence, claims resting upon it must be handled, if not with extreme caution, then certainly warily. Specifically, not only are the conclusions of abductive reasoning open to critique, the relationship between abduction and other forms of inference (and accompanying evidence) in belief formation and justification is contested and this contestation must be acknowledged.

Developing this line, it is argued that, if abduction describes the inferential process whereby qualitative researchers identify the themes, codes and categories in analysis that thereafter become ‘findings’, then these findings are necessarily insecure or fragile. It is not suggested that abduction is the only process involved in qualitative data analysis and, importantly, abduction’s part in this process is asserted rather than demonstrated. Nonetheless, if abduction is granted even a potential role in analysis then this cannot but problematize the action guiding nature of qualitative research. Of course, the assumption that qualitative research has, for clinical nurses, an action guiding function is controversial. This issue is addressed briefly below and it is critiqued, along with ‘insight’, in Lipscomb (2012).

**Abductive reasoning**

Since nursing publications effectively ignore abduction it is necessary in a paper such as this to be especially clear about the meaning of the descriptor at its core. What then is abduction?

As Råholm (2010a) notes modern usage of the concept is closely associated with the work of Charles Sanders Peirce (1839–1914). Peirce’s understanding of abduction and its place in scientific reasoning varied over the course of his intellectual career. Here, the concept is presented as it appears in *Deduction, Induction, and Hypothesis* (Peirce, 1992 [1878] – henceforth *DIH*) though numerous other writings including, e.g. *Pragmatism as the Logic of Abduction* (1998a [1903]), *Sundry Logical Conceptions* (1998b [1903]), and *The Nature of Meaning* (1998c [1903]) develop abduction further.

In *DIH* Peirce somewhat misleadingly, to modern readers at least, uses the term hypothesis rather than abduction (Hacking, 2007) and, in this form, hypothesis is not to be confused with hypothetico-deductive reasoning (Haig, 2005) or deductive-nomological explanation (Hempel, 1966). Rather, hypothesis making or abduction, as it came to be called, is introduced by Peirce in the following manner:

Suppose I enter a room and there find a number of bags, containing different kinds of beans. On the table there is a handful of white beans; and, after some searching, I find one of the bags contains white beans only. I at once infer as a probability, or as a fair guess, that this handful was taken out of that bag. This sort of inference is called making an hypothesis. It is the inference of a case from a rule and result.

Peirce – emphasis in original (*DIH*, p. 188)

Peirce delineates analytic or deductive inference from synthetic induction and hypothesis formation or abduction and *DIH* (p. 188) famously distinguishes between them thus:

**Deduction**

Rule. – All the beans from this bag are white.

Case. – These beans are from this bag.

\(\therefore\) Result. – These beans are white.

**Induction**

Case. – These beans are from this bag.

Result. – These beans are white.

\(\therefore\) Rule. – All the beans from this bag are white.

**Hypothesis**

Rule. – All the beans from this bag are white.

Result. – These beans are white.

\(\therefore\) Case. – These beans are from this bag.

For Peirce, a hypothesis is formed ‘where we find some very curious circumstance, which would be explained by the supposition that it was a case of a
certain general rule, and thereupon adopt that supposition’ (DIH, p. 189). Significantly, supposition is not the same as claiming that, with any degree of certainty, ‘the proposed hypothesis might be true . . . [and instead a weaker claim is made, namely that] the hypothesis is initially plausible and worthy of further pursuit’ (Haig, 2005, p. 377). The reduced nature of this claim is important. Gordon et al. (2005, p. 709) approvingly cite Josephson (1997) in claiming that appropriately derived abductive hypotheses are ‘probably correct’. This is a mistake and instead such hypotheses are, at best, only possibly correct. That aside, abduction or ‘fair guess’ making in the presence of curious or novel circumstances occurs to every person everyday in innumerable contexts. It is neither an esoteric nor an exotic activity and, rather, abduction is a commonplace occurrence that generates, albeit tentatively, ideas about the world.

For example, in a clinical context a nurse notices that a patient appears flushed and drowsy. The patient is having or has recently completed a blood transfusion. The nurse, invoking ‘background theories’ (derived from personal experience and training) reasonably surmises or abducts that the patient might be experiencing an unwanted reaction to the transfusion and she acts to gain evidence to support or refute her informed guess (e.g. by talking with the patient and by taking a set of observations). Oftentimes, as evidence emerges, an initial hypothesis is shown to be in error. Thus, the patient was not in fact flushed. She was instead wearing too much rouge blusher and, given a hectic day, she was simply having a nap. On the other hand it is also the case that fair guesses, fair insofar as they are grounded on reasonable if disputable assumptions, are frequently upheld and proved right. Thus the patient was experiencing an unwanted reaction.

While the focus of this paper is on abduction in qualitative research rather than abduction in practice this example demonstrates the generative nature of abductive reasoning since ‘generative methods reason from warranted premises to an acceptance of the knowledge claims in question’ (Haig, 2005, p. 383). It also describes an instance of abduction by analogy. Analogical abduction transposes or relates past experience (here of kindred unwanted reactions) to the new situation and it ‘uses past cases of hypothesis formation to generate hypotheses similar to the existing ones’ (Thagard, 1993, p. 54). Abduction by analogy may be contrasted with existential abduction (though the two ‘forms’ overlap in use) wherein hitherto unknown or unexperienced objects or relations are hypothesized. Both forms of abduction are, I suggest, evident during data analysis in grounded theory (though grounded theorists may object) and, it will be claimed, many other forms of qualitative thematic analysis.

Although the description of abductive reasoning given by Peirce is, on the face of it, convincing, two points require attention. First, despite the innate sensibleness of Peirce’s bean-based vignette and regardless of whether analogous or existential abduction is considered, making an abductive hypothesis, ‘of a case from a rule and result’, is fraught with difficulty and in consequence those engaging in this process must temper assertions based on such inference. Second, the relationship between the various forms of reasoning (abduction, deduction, and induction) is, in application, equivocal or opaque and the extent to which deductive and/or inductive inferential forms ‘must’ support abductive reasoning is unclear. Put another way, ought deductive and/or inductive logics and the evidence (broadly defined) associated with them always be sought to support initial abductive guesses or can abduction ‘stand’ on its own? Must, as in the above example, nurses always act to buttress or scupper abductive hunches by seeking additional confirmatory or discrediting information or can justified beliefs about the world be grounded simply on abductive reasoning? As will be shown, this question has special significance in qualitative research – particularly when more than one explanatory ‘option’ is available.

Choosing between alternative explanations

The need to temper assertions based on abductive inference becomes apparent as soon as we probe Peirce’s exemplar more closely. And, although the following argument may at first appear digressionary, ‘pushing’ the description of abduction contained
within the bean exemplar exposes an important conundrum in qualitative data analysis.

Peirce presents an uncomplicated scenario wherein one handily placed bag contains ‘white beans only’. However, what if two white-bean-only bags are available? Or, what if, in addition to the two bags containing only white beans there is third bag on the table within which, among the white beans, one black bean sits? It might be argued that the presence of a single black bean does not significantly influence the statistical likelihood that any particular handful of beans would be other than white were they to ‘escape’ and be found and, in consequence, the found beans could have come from any one of the bags (assuming no other option).

Yet if the handful of found white beans might now come from any of the three bags – i.e. there exist multiple legitimate explanations or explanatory options – must abduction cease or, more pressingly, how are beliefs formed and justified when compound options or choices are available to the hypothesizer? Further, we might ask, for how long would the bag containing non-white beans remain a legitimate option if increasing numbers of black beans were substituted for white beans? Thus, if in a bag of mainly white beans (no = 99) one black bean is not likely to appear in any randomly selected handful, what can reasonably be assumed about beans taken from a bag where white beans are substituted by two, three or ‘n’ black beans? This problem can be variously interpreted (and its resolution clearly depends, in part, upon the number of found white beans). Here the point being made is simply that, again, assuming the found beans come from only one of the three bags, and at a stage before which ‘too many’ black beans appear in one of the bags, the found white beans could abductively be assigned to any bag. And yet, as the number of legitimate options increases, the danger of ascription error rises.

It will shortly be argued that nurse researchers face similar dilemmas when analysing qualitative data (when more than one interpretive option is always available). Nevertheless, in this instance, a sensible abductive reasoner will refrain from making a hypothesis about any one bag (i.e. ‘they came from that bag’) and instead the found beans might be assigned to a class of bags (e.g. ‘they come from the class of bags with all or mostly white beans and no or few black beans’). This again seems straightforward albeit that, first, the point at which ‘too many’ black beans appear in a legitimate option bag remains open and, second, the example might be said to illustrate how different inferential forms closely interact in explanation. However, for nurses – and especially qualitative nurse researchers – while the importance of abductive reasoning should (as per Rāholm, 2010a) be recognized, in application the existence of alternative hypotheses or hypothesis choices severely undercuts the amount or degree of confidence that can be invested in any particular choice. Yet before examining this statement further it is perhaps useful in the first instance to position or relate Peirce’s ideas to the context in which they were made.

Abduction contextualized

Despite wide ranging interests in theory and logic, Peirce was a practicing physical scientist (from 1859 to 1891 he worked on the US Coastguard’s Geodetic Survey measuring fluctuations in the intensity of the earth’s gravitational field, Burch, 2011) and, maybe, it is in consequence easier to situate his ideas on inference and scientific method within a natural rather than social science or humanities ‘frame’.

Thus, abduction, as insightful or creative perception is, in Peirce’s developed theory of scientific enquiry merely the first of three stages namely: ‘abduction or hypothesis development, deduction or prediction of consequences, and induction or experimental testing of hypotheses’ (Anderson, 2009, p. 155). That is, first, reflection or considered but nonetheless speculative conjecture upon a problem or observation generates a tentative abductive hypothesis. Second, this hypothesis is translated into a statement capable of deductive testing and, importantly, event observations that will (or will not) support this hypothesis should be other than those that generated the hypothesis under investigation. Third, additional support for the hypothesis should be sought by inductive testing. Here event-objects are manipulated in ways that can only or with a high degree of probability happen if the framing hypothesis is correct.
Lawson (2002, 2010) summarizes this sequence as *if-then-therefore* and, in application and significance, the relationship between the various forms of inference is both important and contested. Howson (2000), though he does not necessarily agree with the suggestion, notes that abduction has been presented as a fundamental or synthesizing concept, as ‘the inferential method of science’ (p. 112, italicization in original) and, in this vein, Saether (1998) positions abduction as retrodiction (though this term is disputed) as a means of overcoming the problematic of dualist deductive and inductive inference (see also Downward & Mearman, 2007). Thus although different theorists interpret the concept differently abduction has been presented as if it were *primus inter pares* – as the form or method of reasoning that generates the insightful idea that other inferential forms then hone and test.

However, whether or not abduction holds some special place in scientific activity, social scientists and humanities scholars might regard deductive experiment and inductive testing (the second and third of Peirce’s stages) as inappropriate or unavailable or, at a minimum, challenging in their disciplines. And, likewise, many nurses will, depending upon their interests, also encounter difficulty with Peirce’s developed theory of scientific method.

**Abduction and nursing**

Nurses are not often troubled by bean allocation dilemmas and they rarely operate as practitioners or researchers in circumstances that easily lend themselves to formal experimental deductive and inductive testing. More realistically clinical nurses work in extremely dynamic environments and, in these circumstances, belief formation and belief justification becomes, relative to bean exemplars and simplifying natural scientific assumptions, exponentially more complex.

With regard to research, belief formation ‘outside’ of the natural sciences (i.e. branches of sociology and psychology together with the humanities) is problematic not least because both society and its members are open insofar as they have *sui generis* powers that preclude closed or laboratory-like natural science experimentation and, therefore, although human behaviour is frequently patterned (demi-regularities, Wilson, 2005), causality, as commonly understood, cannot be established in the non-natural sciences as it can be, or it is claimed it can be, in the natural sciences (Bhaskar, 1997, 1998). Moreover, whenever people rather than things are discussed, normative assumptions inevitably interpenetrate or coexist alongside factual claims.

Values are abstracted from Peirce’s exemplars since, excepting a desire to maintain logical coherence (bar valorizing logic), we do not care about the outcome or conclusions of bean-based reasoning. Nurse researchers do, however, care about the conclusions of their arguments/beliefs because they apply to people and, moreover, normative assumptions (possibly unarticulated) are often conflated in analysis with facts. This may or may not be considered a problem. However, it is here proposed that reflectively derived explanations or arguments grounded in or on abductive reasoning are vulnerable to critique since, returning to the problem of multiple legitimate explanation (i.e. where the found beans could have come from more than one bag) nurse researchers may fail to notice that the existence of ‘close alternative’ explanations potentially undercuts belief justification and, it is here asserted, this problem is exacerbated where strongly held values foreclose upon or limit the examination of other explanations. Further, while all observation is theory laden, even hypotheses grounded upon uncontested factual claims are in the social/human world frequently unavailable for ‘testing’.

**The generality problem**

Problems in choosing between alternative explanatory options are not confined to arguments built upon abductive inference. However, for Peirce, hypothesis generation is tied to the affective or ‘sensuous element of thought’ (*DIH*, p. 199, emphasis in original) and, likewise, Haig (2005) recognizes that abduction entails both psychological and logical processes. Thus, while belief formation inescapably involves some element of personal or subjective understanding, abductive reasoning is particularly dependent upon the idiosyncratic reflective abilities of abductors.
and this is troubling for; adapting Bishop (2010), first, let it be assumed that every plausible abductive hypothesis is reflectively derived – where reflection signifies that a ‘belief is justified on the basis of . . . [personal] knowledge . . . arrived at . . . as a result of a highly (but not perfectly) reliable way of reasoning’ (p. 286). Then, second, in such instances belief justification necessarily rests on procedural or reliabilist criteria – i.e. the justificatory status of a belief is merely a measure of the reliability of the process that produced it or, put another way, reliabilism ‘asserts that a belief is justified to the extent that it is acquired by reliable processes or methods’ (Haig, 2005, p. 383). Third, since the number of variants in ‘belief-forming process-types’ (Bishop, 2010, p. 285) is in all instances unlimited or, if this is disputed, at least extremely large (recognizing that hypotheses vary in plausibility – Boutilier & Becher, 1995) it is, fourth, inevitable that a range of ‘close’ or plausible and ‘distant’ or implausible alternative explanatory hypotheses are available at each stage in the reasoning process. Given this, fifth, on strictly procedural or reliabilist grounds, there is no clear way, no non-self referential way, of choosing on principled grounds between the validity of alternative plausible hypotheses and, sixth, an abductive claim reflectively arrived at can only be, in the last instance, asserted rather than demonstrated.

Bishop’s challenge and qualitative research

The ‘generality problem’, as it is known, applies whenever ‘a belief’s justificatory status is, or is taken to be, a function of the reliability of its production’ (Bishop, 2010, p. 287) and, if this is accepted, then reflectively derived beliefs cannot be accepted on procedural or reliabilist criteria because, as Bishop (2010) notes, there is no principled means of specifying why any belief forming process is necessarily correct in a particular instance. This is a strong claim and it can be contested. Justification need not be ultimate or decisive and, in many instances, ‘sufficiently probable’ (Boutilier & Becher, 1995, p. 44) is perhaps good enough (though note, Howson, 2000, dismisses this sort of argument – an argument he associates with ‘naturalized epistemology’, p. 113). Further, Peirce thought that, over the long term, scientists might move towards justifiable truth claims even if, at any particular moment, all claims are necessarily fallible and, it could be argued, analogous reasoning might be deployed against strong versions of the generality problem (i.e. knowledge may be subject over time to some form of Darwinian evolutionary fitness test – though Howson, 2000, again problematizes this). Nonetheless, focusing upon reflectively derived belief forming processes allows this interpretation of Bishop (2010) to highlight important truisms – namely, alternative hypotheses can always be reflectively abducted from available evidence and alternative evidence can always be sought to support any particular hypothesis.

For example, we might imagine transcribing dialogue capable of being interpreted as ‘anxiety’ or ‘aggression’. But which interpretation is ‘correct’ or, more accurately, which interpretation best explains what was said? In my own work I have spent long periods of time reworking theme, code, and category descriptions around the concept (eventually labelled) ‘professionalism’. I finally chose descriptors that, in my opinion, ‘felt’ accurate. But I was aware that earlier iterations, earlier interpretations, were also compatible with the data.

The generality problem is not, to restate, a problem only of abductive reasoning. However, when the generality problem is encountered: ‘Since there are true unjustified beliefs and false justified beliefs the process relevant for determining the justificatory status of the belief cannot be the token that produced it’ (Bishop, 2010, p. 286). This lends credence to the idea that abductively derived hypotheses require support from deductive and inductively gained logics/evidence if they are to ‘hold’ and, as noted, for Peirce the second (deductive) stage in scientific method specifies that data other than that which led to hypothesis formation be used to test that hypothesis.

Perhaps all this says no more than that abductive inference is defeated by superior (i.e. better supported or more explanatory) accounts and that, to have credibility, abductively derived conclusions need to be sustained by deductive and inductively derived evidence. However, this leaves open the question of how we can pin down what ‘better supported’ or ‘more explanatory’ mean. These sorts of question raise larger episte-
mological issues than a single paper can grapple with. Yet while evidence ‘counts’, evidence or facts cannot – to restate – be identified outside of theory and, as the generality problem makes clear, multiple plausible theories or hypotheses are always available to give ‘form’ to evidence. (Hayek wryly notes that: ‘empirical studies taken alone are seldom decisive in determining “the facts of the matter”’ – in Caldwell, 2005, p. 380.) Thus, the force of Bishop’s (2010) challenge remains and is particularly felt when belief rests on abductive assumptions that are in a social/humanities (nursing) context, in practice and possibly in principle, necessarily subjective and formed in relation to experience that is unrepeatable, unquantifiable and untestable and where, often, facts and values elide (i.e. qualitative research).

Abductive inference in qualitative analysis

Richardson & Kramer (2006) argue that abductive inference describes, in grounded theory, ‘the process of associating data with ideas’ (p. 500). Abduction or hypothesis formation occurs when researchers, during data analysis, shape or insightfully generate beliefs about the meaning or significance of their data on non-deductive and non-inductive grounds (Boutilier & Becher, 1995). Here it is suggested that abductive inference does not simply underpin the creation or development of findings in specific versions of grounded theory but, rather, abduction may describe the inferential form that underpins many types of thematic qualitative analysis. Specifically, when qualitative researchers, during analysis, develop themes, codes, and categories that structure data they are, in part at least, insightfully abducting or, to invoke Peirce, they are making ‘fair guesses’ about the meaning of data.

This assertion might be challenged. However, let us accept it as a possibility. What then is the status of data in qualitative analysis? To support their position Richardson & Kramer (2006) approvingly cite Coffey & Atkinson (1996) who note that: ‘Our important ideas are not “in” the data, and however hard we work, we will not find those ideas simply by scrutinizing our data ever more obsessively’ (p. 155). This is an important claim. It implies that data are not ‘mined’ (i.e. understanding is not ‘extracted’ if this simply means making overt what exists but is hidden) and, instead, qualitative data (broadly defined) provide researchers with raw material from which interpretive constructions are made. This, it must be noted, is not ontologically implicative. It does not force upon researchers idealist or postmodern perspectives and the notion of construction presented above need not alarm realists. The quotation does, however, acknowledge that researchers work imaginatively to create meaning from data and it is proposed that the logic informing this process involves abduction.

However, if qualitative researchers do employ abductive reasoning when analysing and interpreting data then, given the aforementioned ‘generality problem’, what can we say about belief formation and belief justification in qualitative studies? As described the generality problem insists that where a belief’s justificatory status is a function of the reliability of its production, and where belief formation rests on process-types that cannot on procedural or reliabilist criteria distinguish on principled grounds between unlimited or extremely large ranges of potential or possibly available hypotheses, then we might conclude that findings based upon abductive hypotheses are, to put it crudely, asserted and not demonstrated. They are not defeasible (Koons, 2011). Moreover, this ‘issue’ – problematizing the plausibility of researcher analysis and the beliefs derived from analysis – applies not only in regard to a study’s main conclusions, it also applies at each intermediate step in the production of conclusions where these steps rest upon or involve abductive inference (i.e. potentially at every stage in theme, code, and category development).

For UK nurses who ‘must deliver care based on the best available evidence’ (Nursing and Midwifery Council, 2008, p. 7) this is problematic. Nurses as members of a practice-based discipline do not read or consume research simply because it is interesting. Rather, research is accessed because it can explain, describe, enlighten, aid understanding or otherwise offer instruction about aspects of practice. Reading research reports can alter belief and in so doing, insofar as belief informs behaviour, research is action guiding. Evidence is not of course synonymous with research.
However, evidence is most clearly action guiding when, emerging from research, it is part of a credible and logically cohesive argument that in important (though difficult to specify) respects demonstrates rather than merely asserts conclusions and, if qualitative research cannot do this (because the logic of its argument incorporates abductive reasoning), then perhaps its findings are of indeterminate use value.

Qualitative researchers would presumably object to this last statement. However, to refute the claim that ‘qualitative research is of indeterminate use value when the logic of its construction rests upon abductive inference’, it is necessary to specify how the problems thrown up by abduction (e.g. the generality problem) are being addressed and, as far as I can see, this is not being done. Thus, despite having reviewed a reasonably large albeit unquantified number of qualitative nursing research reports, I am unable to locate instances of researchers acknowledging or substantively engaging with the possibility that alternative explanations, alternative hypotheses – specifically here of theme, code or category descriptions – could be offered of their data. That is, and mindful of the problem described earlier when multiple legitimate options were presented in relation to bean allocation, I cannot find instances of researchers stating the range of possible interpretations of data that they considered (e.g. ‘on these grounds interpretations “a”, “b” and “c” appeared plausible as code descriptions’) and I cannot find instances of how any particular choice was justified (i.e. ‘against these named criteria interpretations “a”, “b” and “c” were considered and option “b” was chosen as being “the best” code description because et cetera’).

Perhaps this is to demand too much or, perhaps, this is to demand something foolish? Theme, code, and category descriptors are rarely if ever formulated as propositional statements and the logic by which they are derived – a logic that may be based on abduction – is almost never described and it is possibly only in this form that they could be defended in the manner outlined above. Further, presenting this type of detail/explanation runs counter to current research conventions that favour the advancement of unambiguous singular ‘truths’ or research outcomes (reviewer suggestion).

Alternatively, it may be that researchers do undertake the steps suggested here (i.e. they consider alternative options) but, because of constraints imposed by journal word allowances, these details become lost in the writing-up process. Moreover, researchers do, of course, recognize that more than one interpretation of data is possible and, when teams analyse data, various consensus forming strategies are described in recognition of this fact (or rather they are stated, the detailed process of consensus formation is generally brushed over). However, in the absence of evidence to the contrary we might conclude that these steps are not taken and, since qualitative nurse researchers do not appear to take this matter seriously it is reasonable to suppose that its significance – the threat to belief justification, the threat to the use value of such work – is unrealized.

A retort to this argument is that, to paraphrase comments made during the writing of this paper, ‘were you me, had you been there, had you experienced that situation, you would know that this interpretation is accurate.’ This defence has at least two components. First, the researcher making the statement clearly felt that experience ‘counts’. However, as Hempel (1945) recognized, having a “sense of evidence”, or a feeling of plausibility” (p. 8) regards evidence is an inadequate justification for any hypothesis involving, as it does, ‘a confusion of logical and psychological considerations’ (p. 8). Second, it might be argued that the statement implicitly allows that abductive data interpretation or hypothesis making can be justified or supported by either formally articulated and identified background or auxiliary theories or, less formally, by a priori assumptions about the world (subjective contextualized understandings).

Re-emphasizing a point made earlier, Evers & Wu (2007) highlight the “role of background theory [and one might add here “values”] in helping to adjudicate the matter of best explanation. Strictly speaking, for inferential purposes hypotheses never occur in isolation but rather as embedded in some theoretical context’ (p. 207). This is important. Abduction is associated with inference to best explanation and it might be argued that explanatory power or goodness is linked in some way to the ‘fittingness’ of explanation to existing theories/ideas about the world. In this vein
critical realists permit conclusions to be drawn because they best explain available evidence and, from this perspective, abduction is associated with the number and sophistication of available background theories.

More accurately critical realists substitute the terms retroduction and retrodiction for abduction and, although the following definitions are not applied consistently, retroduction and retrodiction describe forms of abduction wherein differing ‘quantities’ of background theory are held or applied in relation to study objects. Thus, retroduction occurs when knowledge of mechanism function is relatively impoverished – i.e. when we believe we know little about what is happening in relation to the study object (few background theories are available) and retrodiction occurs when knowledge of mechanism function is relatively advanced – i.e. when we believe we have good reason to think we know what is going on or happening in relation to the study object (many background theories are available) (Professor S. Fleetwood, personal communication). However, as Howson (2000) observes: ‘What is plausible and what is not is likely to be a highly context-dependent affair, if not an outright subjective one, unless it is tied to some objective standard’ (p. 114). Objective standards regarding beliefs about background or auxiliary theories are thin on the ground in much qualitative work and the plausibility of abductively derived convictions therefore remains problematic. And so, on balance, and to repeating points made previously, the question ‘how are we to know what the “best explanation” is?’ remains undecided.

Nevertheless, let us allow that highlighting the significance or role of background theory in adjudicating between discrepant explanatory hypotheses may prove useful if the presence or application of such theories supports particular belief forming processes. While it is attractive to imagine that this might occur, it is more difficult to demonstrate the link in concrete form. Thus, merely because theory ‘x’ exists and, in relation to the data being analysed, theory ‘x’ appears to support interpretation ‘y’, we cannot conclude that ‘y’ is in fact an adequate interpretation or hypothesis. Before this occurs it must be established that ‘x’ does indeed support ‘y’. It must be shown that other disConfirming or at least contrasting theories have been considered and on good grounds rejected and, in a list that could be extended, the possibility that other interpretations cannot be equally supported by the same or other theories should be considered.

Pragmatically (using the term in a colloquial sense), it may be reasonable to assume that straightforward or non-contentious hypotheses do not require such detailed justification. Yet, not only are the descriptors ‘straightforward’ and ‘non-contentious’ question begging, it is also of note that within the nursing literature this level of engagement is hardly ever demonstrated and, therefore, the idea that (almost regardless of quantity or objectivity) background theories usefully offer justificatory support to abductively inferred hypotheses remains underdetermined. It could be the case that they can. However, it is not shown and, insofar as all theory is epistemically underdetermined, it may not be showable (Stanford, 2011).

Another response to the challenge of justifying qualitatively derived belief based on abductive inference might be that, where researchers interview different participants consecutively (or the same participant on consecutive occasions) then an abductive hypothesis formed in relation to one interview could be ‘checked’ or ‘tested’ against the results of subsequent interviews. Temporally later interviews might then be seen as new data (or later comments in a single interview might substantiate earlier abductive hypotheses – though this raises its own problems) and, following Peirce, it could be argued that this meets the need for ‘supportive’ data to be other than that which generated the initial hypothesis.

However, first, most qualitative research is small in scale and qualitative researchers often both collect and analyse data. Full or detailed analysis may occur after all interviews are concluded and, when this occurs, researchers cannot read or interpret a transcript unaware of the content of other interviews. The researcher’s encompassing or totalizing perspective may be portrayed as a strength in qualitative work. Yet because every act of interpretation is performed in full knowledge of all data the possibility that themes, codes, and categories can be abducted from a transcript ‘as if’ that data were a separate and distinct
entity must be discounted. Second, if, somewhat oddly, full and final analysis did occur at the close of each interview (i.e. before the next interview was conducted) then this is not disclosed and I am unable to locate examples of reports in the nursing literature that engage, in this way, with the problem of alternative or multiple theme, coding or category ‘options’.

For example, I cannot see statements such as: ‘when interpreting interview 1 three code descriptors “a”, “b” and “c” appeared plausible. In interview 2 each of these code descriptors was checked against responses in the following manner etcetera’. Thus, as with background theories, although this approach may be viable, its effectiveness or utility in meeting what is here termed the generality problem remains to be shown.

**Concluding comments**

For Audi (2011), the ‘uncritical tend to believe too much that is unsubstantiated; the overcritical tend to believe too little that is true’ (p. 5). Råholm (2010a) is not uncritical; however, if Råholm (2010a) underplays the problems inherent in abductive reasoning the danger in this essay is that its difficulties are overblown. Focusing on the nature of belief formation and belief justification might imply or suggest that mental processes and the conduct that these processes allow can and should _always_ be logical, rational, reasoned, and justifiable. This is not my position.

Peirce (1998a) claimed that: ‘The elements of every concept enter into logical thought at the gate of perception and make their exit at the gate of purposive action; and whatever cannot show its passports at both those gates is to be arrested as unauthorized by reason’ (p. 241). That said a good deal ‘of our knowledge is possessed and used by us without ever being articulated . . . [and whilst] tacit beliefs contain tacit error as well as tacit knowledge’ (Gray, 2007, p. 40); nevertheless: ‘The appropriateness of our conduct is not necessarily dependent on our knowing why it is so. Such understanding is one way of making our conduct appropriate, but it is only one way’ (Hayek, 2006, p. 58). Thus, despite the problems outlined above, in everyday life, perfectly sensible abductive inferences are made by every one of us and in many or even most instances our suppositions about the world prove to be correct or, at least, correct enough. Generally, though reason may not ‘authorise’ such suppositions, they prove sufficient for action.

Abduction in research is, however, another thing. Research processes include or require the demonstration of logical competence and if this competence is not evident then findings are not carried and they must be rejected.

A critique of my own work, where interview transcript analysis incorporates abductive reasoning, led me to this subject. And concern with the validity of the interpretative process in that work directed me to Peirce. Though I would prefer it otherwise it is difficult not to conclude that abduction involves vis-à-vis belief formation and belief justification, a ‘perilous step’ (DIH, p. 192) and, cognizant of the especially fallible, provisional and contested nature of abductive inference Peirce noted that:

As a general rule, hypothesis [abduction] is a weak kind of argument. It often inclines our judgement so slightly toward its conclusion that we cannot say that we believe the latter to be true; we only surmise that it may be so. (DIH, p. 189)

No research or evidence, no truth directive claim, is ever infallible or immune to refutation/revision. However, surmising that something ‘may be so’ is not the same as demonstrating that it is so (or is likely to be so) and, thus, if qualitative researchers do indeed use abductive inferential forms when analysing data then, because they can only surmise on the basis of such reasoning, the practical or real world use value of qualitative studies for nurses is diminished as the process of belief formation cannot sustain or justify substantive action guiding claims.

It might at this point be objected that qualitative studies are only action guiding insofar as they generate insight or new understanding in the mind of the reader. However, first, it is a moot point whether research consumers (readers) can obtain genuine insight or understanding on the basis of mere supposition and, second, researchers probably want to claim that their findings are more than ‘just’ plausible guesses. Thus, following Hayek (2006), while in everyday life it is not necessarily the case that ‘we ought to believe only what has been demonstrated to be true’
(p. 57); nonetheless, research findings, cannot be accepted – they cannot be action guiding, in the absence of adequate demonstration.

To address the inherent weakness of abductively derived claims in qualitative work it might be proposed that, following Peirce’s three stage scientific method, if the findings of qualitative researchers are to inform nursing practice in a meaningful way then abductive supposition must be supported by deductive and inductively sourced evidence which, importantly, differs from that which generated the initial hypothesis (this would engage with the generality problem). Alternatively, this might seem controversial or unnecessary insofar as qualitative research does not make generalizing claims and the requirement is, moreover, clearly problematic. Further, deduction and induction are, as inferential forms, themselves subject to critique and many aspects or elements of the social world – i.e. common nursing interests – do not, as previously stated, lend themselves to the types of formal testing or experiment associated with these kinds of reasoning. Nevertheless, it is not perhaps entirely unreasonable to expect that qualitative researchers should take the logic of their endeavours seriously and perhaps the above assertion should not simply be dismissed out of hand.

This paper discusses a relatively underexplored topic, abductive inference in qualitative research, and it suggests that the acknowledged fallibility of this form of reasoning, a fallibility illustrated by the ‘generality problem’, must, because it effects belief formation, belief justification and hence research ‘use value’, be recognized. This is not an attack upon qualitative work (kindred problems infest quantitative studies). Rather, since more conceptual work needs to be done here, the paper simply aims to provoke and stimulate discussion.

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