Measurement Issues in Studying Personal Epistemology

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Quantitative measurement of personal epistemology, i.e. individuals' conceptions of knowledge and knowing continues to be a great challenge, despite many attempts to develop instruments. Building on one of the most promising models and methods, that of Kuhn et al. (2000), this study attempts to move the method forward by integrating qualitative components into the Kuhn et al. forced-choice measure. Seventy-five participants (parish staff and other workers) were asked to fill in the Kuhn et al. measure and write justifications for their choices. The compatibility between the responses to the measure and the justifications for them was then analysed. This analysis showed that not all justifications were compatible with the respondents' choices in the quantitative measure. In most cases, the incompatible justifications represented a lower level of epistemological development than the forced-choice responses.

Every day individuals encounter numerous situations in which contrasting knowledge claims are presented to them, for example claims concerning climate change or the safety of certain foods. In these situations, they have to decide which of the claims to believe and on what grounds. Individuals' judgements are at least to some extent influenced by their personal epistemology, i.e. conceptions of knowledge and knowing. For example, depending on an individual's beliefs, s/he can consider a piece of news in a newspaper as an absolute truth, as an opinion among other opinions, or as a claim that can be critically evaluated and compared to other claims.

For many researchers, the construct of personal epistemology includes content related to the nature of knowledge and knowing (Hofer & Pintrich, 1997). There are, however, differences in labelling the construct (e.g. epistemic development, epistemological assumptions, epistemological beliefs) and disagreements about its definition and boundaries (e.g. whether beliefs about learning should be included in the construct) (Hofer & Pintrich, 1997).

The majority of the psychological research on personal epistemology can be traced to William Perry's (1970) studies (Hofer & Pintrich, 1997). He was the first to demonstrate how personal epistemologies develop. Since then, the construct has most frequently been viewed either as a developmental process or as a system of beliefs (Hofer, 2004). Those who apply the developmental approach (e.g. Baxter Magolda, 1992; Belenky et al., 1986; King & Kitchener, 1994; Kuhn, 1991; Perry,

1970; Pirttilä-Backman, 1993) have posited that individuals' views about knowledge and knowing follow a sequence of positions that are qualitatively different from other positions. It has been suggested that the developmental task central to this progression is "the coordination of the subjective and objective dimensions of knowing" (Kuhn, Cheney & Weinstock, 2000, 310). Models of systems of beliefs (Schommer, 1990), on the other hand, view personal epistemology as "a belief system that is composed of several more or less independent dimensions" (ibid. p. 498).

In this study, I adopt the epistemic developmental model of Kuhn et al. (2000) because of its methodological achievements. In the model, progression is depicted as a sequence of levels ranging from realist to evaluativist. Someone at the *absolutist* (and similarly at the pre-absolutist realist) level regards knowledge as objective. In absolutist thought, assertions are considered as facts that represent reality either correctly or incorrectly. Therefore, if two persons come to different conclusions, both of them cannot be right; rather, one of them is in a state of misunderstanding or lacks information. (Kuhn et al. 2000.)

At the next level, the *multiplist* level, objectivity is abandoned and claims are seen as subjective opinions generated by their owners. Because in multiplist thought there are no standards against which to evaluate different opinions, all opinions are considered equally right. At the *evaluativist* level, objectivity is reintegrated, but possesses a novel meaning: claims are now seen as "judgements that can be evaluated and compared" (ibid. p. 311). Two positions can each have some rightness, but one can be "better supported by argument and evidence" (ibid. p. 312), and therefore be "more right". (Kuhn et al. 2000.)

Kuhn et al. (2000) suggest that there are different types of knowing judgements, and they distinguish between a range of judgements: those of personal taste, of aesthetics, values, truths about the social world and truths about the physical world. Kuhn et al. acknowledge that other categorisations are possible, but do not give any justifications for including other domains than truth into their epistemic model.

Studying personal epistemology

Generally, assessing personal epistemology is challenging because of the complexity of the construct. Part of this challenge comes from the "idea that epistemological beliefs are for the most part unconscious, if not tacit" (Schommer-Aikins, 2002, 115) and "much like an iceberg, the bulk of such beliefs is not directly accessible, but instead submerged from clear view" (Buehl & Alexander, 2001, 388). Despite the difficulties caused by this invisibility, personal epistemology has been studied using a variety of different methods (for a review of measures of personal epistemology, see Duell & Schommer-Aikins, 2001; Hofer & Pintrich, 1997). It is worth noting here that particular conceptualisations of the construct have directed methodological choices (Hofer, 2004) and the development of the accompanying instruments (Duell & Schommer-Aikins, 2001). In the developmental approach, researchers have most

often applied interview methodology (e.g. King & Kitchener, 1994; Kuhn, 1991; Perry, 1970; Weinstock, 1999) whereas researchers who build their work on the models of systems of beliefs (Schommer, 1990) have most frequently used surveys, in which beliefs have been measured on a Likert-type scale. In response to cost, time and complexity of interpretation of interview methods, some researchers working with the developmental approach (e.g. Hallett, Chandler, & Krettenauer, 2002; Kuhn et al., 2000; Wood, Kitchener, & Jensen, 2002) have also developed paper-and-pencil methods. There are, however, potential weaknesses in the existing instruments and therefore effective quantitative measurement of the construct remains a challenge (Duell & Schommer-Aikins, 2001; Greene, Azevedo, & Torney-Purta, 2008).

Kuhn et al.'s assessment instrument

In what follows, I present Kuhn et al.'s (2000) forced-choice paper-and-pencil assessment instrument in more detail. The aim of their instrument is to capture what they consider the key features of the developmental progression from absolutist to multiplist and from multiplist to evaluativist, i.e. "the coordination of objective and subjective dimensions of knowing" (ibid. pp. 314–315). The instrument consists of 15 items, each containing two contrasting knowledge statements (e.g. "Robin believes one book's explanation of how the brain works"; "Chris believes another book's explanation of how the brain works"). The transition from absolutist to multiplist is assessed by asking the respondent whether only one view could be right or whether both could have some rightness. A response that only one can be right is assigned the absolutist level. If the second option is chosen, the transition from multiplist to evaluativist is assessed by asking the respondent whether one view could be more right than the other. A response that one view could not be more right than the other is assigned the multiplist level, and a response that one could be more right is assigned the evaluativist level. In the assessment, there are three items in each five domains (taste, aesthetics, values, social truth and physical truth).

Kuhn et al., (2000) report that the ability of this instrument to assign individuals to a particular epistemological level was studied by assessing 33 college students using both this instrument and a more traditional interview instrument, the Livia problem (e.g. Weinstock, 1999): 73 % were assigned the same level by both instruments, and 94 % were assigned the same or adjacent levels. Kuhn et al. (2000) believe that the congruence is strong enough to justify the use of the paper-and-pencil instrument. However, Kuhn and her colleagues (Kuhn et al., 2000; Kuhn & Weinstock, 2002) point out that the instrument fails to capture the subtleties and scope of epistemological thinking; instead, it provides an approximate indication of an individual's epistemological level. On the other hand, the advantage of the instrument is that it is short and simple, and therefore allows for assessment in multiple domains and content. Kuhn et al. (2000) consider it also theoretically useful, because of its conceptual clarity of what it aims to measure.

The forced-choice instrument of Kuhn et al. (2000) clearly has potential, but it

would benefit from further investigation, because the correspondence reported above does not give information about why some of the participants were not assigned the same level by both instruments. Some insights into this gap in our knowledge can be gained by studying what the respondents think about when they respond to this forced-choice instrument. With that in mind, this study set to understand what the participant has actually responded to when choosing a particular choice-option. The aim was to see whether the justifications given to the forced-choice responses were compatible with each other. Only the domains of social and physical truth were included in this analysis, because questions related to truth can be considered more clearly epistemic than the other three domains.

METHOD

Participants

The participants (n = 75) were parish staff and other workers. The sample comprised 49 females and 23 males (three participants did not indicate their sex), ranging in age from 23 to 63, with a mean age of 44 (SD = 11.4) (three respondents did not indicate their age and one respondent indicated an age of three, which was excluded from the calculation of the mean age).

The data was mainly collected using an online questionnaire. All parish staff and other workers from a particular area in south Finland (n = 361) were sent an e-mail, which included a description of the purpose of the study and a request to participate. The participants were told that the study was about their stance towards different ways of thinking and action. The participants could either fill in the online questionnaire or print the questionnaire, which was attached to the e-mail and fill in the paper-and-pencil version. The response rate was 21 %.

Materials and procedure

The questionnaire consisted of three parts. The first part was the Kuhn et al. (2000) forced-choice assessment instrument of epistemological thinking, and this paper is based on the responses to this instrument. The second part was an instrument measuring values and the third part consisted of demographic questions.

The participants were asked to fill in the Kuhn et al. instrument and to write reasons for each of their responses. Some responses were eliminated from the analysis, because those participants had not answered the questions as instructed and therefore the epistemological level could not be assigned to those responses. Cases like this occurred in both domains (social and physical truth). Several participants did not give any reasons for their choices and were thus excluded from the analysis. However, those who did give reasons for at least some of their choices were included. Altogether 534 justifications were included in the analysis. There were between 29 and 59 justifications per question, i.e., 59 respondents wrote a justification at least once.

To categorise the justifications, I constructed a coding scheme that was based on the descriptions of the three epistemological levels of Kuhn and her colleagues (Kuhn et al., 2000; Kuhn & Weinstock, 2002). However, not all justifications could be categorised based on these descriptions. Therefore, it was necessary to add the descriptions both of the problematic justifications and of their solutions to the scheme.[1] Even so, it remained impossible to categorise all justifications. To assess the interrater agreement, another rater independently categorised 7.5 % of the justifications, which were then compared to my categorisations. The percentage agreement was 80.0.

Results

The results indicated that 68.9 % of the justifications were compatible whereas 15.4 % were incompatible. The remaining justifications were uncategorisable. One has to remember, however, that interrater agreement was only 80.0 %, and therefore it is not possible to draw direct conclusions about the Kuhn et al. (2000) instrument. Nonetheless, because 68.9 % of the responses were compatible, the incompatibility cannot be solely explained by the raters' lack of agreement. Hence, the conclusion is that in some cases the participant's response to the forced-choice task did not correspond with his/her justifications for that response.

Below are examples of participants' justifications, two compatible and one incompatible, to the question concerning different explanations of how the brain works (see above). The level assigned based on the forced-choice response and whether the justification for that response was compatible with that level is presented in parentheses after each example.

> Brains do not work in two ways simultaneously (21: absolutist, compatible).

> Perhaps new research has been taken into account in one of them. It is not a question of a mere opinion (62: evaluativist, compatible).

> Brain research is a developing area of study and the findings are verified. Science corrects flawed theories and in that regard, even the most recently ascertained knowledge may change in some cases. Usually the most recent understanding is considered right (54: absolutist, incompatible).

A closer examination of the incompatible justifications revealed that in the majority of cases (n = 70) the justification represented a lower level of epistemological development than did the quantitative response, whereas only in 12 cases did the justification represent a higher level than that of the forced-choice response.

The distribution of the incompatible justifications among the participants was also

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[1] The coding scheme is available from the author upon request.

analysed. In the majority of cases (n = 18) there was only one incompatible justification per participant; this was followed by two (n = 14) or three (n = 7) incompatible justifications per participant. In three cases, there were more than three incompatible justifications per participant. Concerning the judgement domains, the distribution of the incompatible justifications per participant was as follows: 11 participants had incompatible justifications in both domains, and 29 participants only in one domain, 16 in the domain of social truth, and 13 in the domain of physical truth.

DISCUSSION

The finding that most, but not all, justifications were compatible with the respondents' choices in the quantitative task corresponds with Kuhn et al.'s (2000) study in which performance in their instrument was compared to the performance in a more traditional interview instrument. However, there may be a weakness in the instrument, because the incompatible justifications were distributed among many participants, which indicates that the incompatibility was not due to just a limited number of participants. That the incompatible justifications were distributed in both domains suggests that it was neither especially difficult to provide justifications nor to categorise these justifications in either domain. Thus, it seems that the Kuhn et al. (2000) instrument measures the development of epistemological understanding fairly well, but because of the incompatibilities, we still need a better understanding of what we are measuring when we use this instrument. One way would be to combine interviewing the participants about their responses with a closer analysis of the incompatible justifications. This could pinpoint some of the weaknesses of the instrument, which would help in fine-tuning it. In this way, it can move the measure constructing forward.

In this study, not all participants seemed able to articulate their grounds for answering the way they did. One explanation could lie in the findings of Walker, de Vries and Bichard (1984). In their study of the development of moral reasoning, the respondents were able to understand moral-stage statements that were above their own stage before they could spontaneously produce reasoning of that stage. This was the case in this study: most of the incompatible justifications represented a lower level of epistemological development than did the forced-choice responses. It should be remembered that also other factors may have been at play, for example tiredness or unwillingness to express their bases for their responses.

Consistent with this, the production measures (such as interviews or open-ended questions) generally tend to give lower scores than recognition measures (in which participants recognise claims about personal epistemology) when the developmental levels are being assessed (Krettenauer, 2004; 2005; Tabak & Weinstock, 2008). This makes it challenging to compare the findings from quantitative and qualitative studies of personal epistemology. As shown in this study, assessing epistemologies using both quantitative and qualitative methods within a sample provides valuable insights into the construct of personal

epistemology and its measurement.

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