

Changing epistemologies under conditions of social change in two Arab communities in Israel

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The study of epistemic thinking focuses on how people understand and coordinate objective and subjective aspects of knowing and make sense of multiple and discrepant knowledge claims. Typically described in terms of normative development, cross-cultural studies show differences in epistemic development and characteristics of epistemic thinking. This study focuses on within-culture variations of epistemic thinking, with the assumption that social change will produce changes in development. Arab society in Israel has undergone notable change over the last half century. In this cross-sectional research design, cross-generational comparison and rural–urban comparison were used as proxies for longitudinal social change. Three generations of Muslim Arab women in a village in Israel (20 adolescents, 20 mothers and 20 grandmothers) and 20 Muslim Arab adolescents from a large, mixed city in the same region responded to six dilemmas invoking epistemic thinking. Village adolescents were more subjectivist than their mothers and grandmothers. Sociodemographic characteristics representing greater exposure to diverse people and ideas accounted for generational differences. Both urban and rural adolescents tended towards subjectivist perspectives, and they did not differ. Parents' education levels emerged as the sociodemographic variables most consistently related to epistemic thinking. Epistemic thinking mediated the relationship between generation and gender role/cross-sex relation values.

Keywords: Societal change; Epistemic thinking; Adolescent development; Intergenerational change; Urban-rural; Arabs in Israel; Cultural psychology.

People's common sense understandings about the nature of knowledge and knowing—their epistemic thinking—has grown as a subfield in developmental and educational psychology. The core issues concern how people coordinate objective and relative aspects of knowing and make sense of multiple and discrepant knowledge claims (King & Kitchener, 1994; Kuhn & Weinstock, 2002; Perry, 1970/1999). Various models describe a developmental progression that starts with a view that knowledge is absolute, certain and objective, moving to a view that knowledge is radically subjective, idiosyncratic and uncertain, and then moving to a view that knowledge has objective and subjective sources that require evaluation, interpretation and contextualisation (Kuhn & Weinstock, 2002).

While these different modes of epistemic thinking are posited to be levels of normative cognitive development, there is reason to believe that this development and various other aspects of epistemic thinking are cultural. For instance, the fact that education is a more meaningful factor than age in epistemic development (King & Kitchener, 1994) suggests that particular practices promote

epistemic development. Contact with a diverse environment either within or outside of educational settings triggers shifts from an objectivist to a more subjectivist epistemology, from beliefs in absolute and certain knowledge to beliefs in knowledge relative to contexts and to the knower (Perry, 1970/1999; Weinstock & Zviling-Beiser, 2009). Exposure to diversity happens to different extents depending on cultural practices and social ecologies in which people live (Greenfield, 2009), and variations in diversity therefore might explain the tremendous within-culture and within-age-group variation found in descriptions of epistemic development.

The trajectory described above, from objective to subjective to a considered integration of objective and subjective aspects of knowing, might indeed reflect development within specific cultures—mostly American, Canadian or European based—and within the academic settings in which epistemic thinking has mostly been researched. Only a few studies have examined how cultural values and differences and long-term cultural and educational practices might be implicated in people's epistemic understandings and development (Gottlieb, 2007; Greenfield

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& Bruner, 1966; Kessels, 2013; Kuhn & Park, 2005; Weinstock, 2010). Cross-cultural studies have found variation in epistemic thinking both in development and in the way knowledge and knowing are understood at all ages (e.g., Zhang, 1999). Karabenick and Moosa (2005) found that Omani more than American college students accepted authority as the basis of scientific truth, and were more likely to believe that scientific knowledge was simple and certain. A study comparing the epistemologies of Bedouin and Jewish adolescents in Israel (Weinstock, 2010) found that Bedouins were notably not subjectivist, even in domains of aesthetics or taste, whereas Jewish adolescents had marked tendencies towards subjectivist thinking.

There are also conceptual reasons for suspecting that people in different cultures might have different modes of epistemic thinking and trajectories of epistemic development. From an objectivist perspective, the source of knowledge would be seen as external, such as in an authority figure. In contrast, from a subjectivist perspective, knowledge is seen as coming from individual construction and interpretation. In hierarchical cultures, people tend to defer to authorities, whereas mastery cultures value individual choice. With relevance to accepting the diversity of knowledge claims, from the viewpoint of collectivism and individualism, those in collectivist cultures would be expected to value harmony and thinking in common, whereas individualist cultures would more likely value or accept confrontation and independent thought (Triandis, McCusker, & Hui, 1990). Indeed, the few studies that have specifically looked at epistemic thinking with reference to cultural values have found differences in epistemic understanding in relation to Schwartz's (1999) value typology (e.g., Kessels, 2013) and individualism/collectivism (Youn, 2000). However, even these studies used epistemology assessments derived from conceptions of epistemic thinking and its development based on studies in the United States and Western Europe.

CURRENT STUDY

Moving from cross-cultural research, this study looked at epistemic thinking as a cultural psychological phenomenon by examining within-culture variations. Particularly as exposure to diversity appears to be a factor in epistemic development, the research focused on different subgroups within cultures that might be assumed to differ by exposure to a more diverse everyday environment and a greater diversity of perspectives and norms.

Building on the sociologist Tönnies (1957), Greenfield (2009) has proposed that shifts in either direction between two ideal sociodemographic ecology types, *Gemeinschaft* and *Gesellschaft*, will produce corresponding changes in cognitive and social development. A *Gemeinschaft*

ecology would be rural and relatively self-contained, having low technology, low division of labour, education at home and a subsistence economy. Social relations are characteristically enduring and with interdependent kin. The other type, *Gesellschaft*, has the opposite characteristics of high technology, education at school, regular contact with the outside world, commerce and an urban environment. Social relations are often fleeting and with independent strangers. The *Gemeinschaft* ecology is more homogenous and much less characterised by internal diversity and confrontations with diversity than is the *Gesellschaft* ecology. Thus, one might predict that people in the former would develop epistemic thinking that does not recognise the possibility of multiple knowledge accounts and that does not value heterogeneous sources of ideas or the notion that knowledge comes from the individual rather than from the known group and tradition. In contrast, the latter, characterised by exposure to diversity in school, in economic life, through technology and in everyday interactions, would more likely accept diversity of perspectives and the individual as a source of knowledge. In addition, the impersonal, science orientation is considered to be more *Gesellschaft* in that its development is consistent with high technology, higher education and highly differentiated roles concerning who are knowledge experts, in contrast to social, traditional knowledge which is more tied to low technology, home education and a simpler division of labour in which family members or community leaders are knowledge experts (Keller, 2007).

This study looks at a particular population, Muslim Arabs living in north-central Israel, which has undergone notable social change over the past few generations, from a more *Gemeinschaft* towards a more *Gesellschaft* ecology. The population is surrounded by the dominant, *Gesellschaft*-oriented culture, and thus there will be variation between individuals and subgroups in the amount of contact with the two ecological orientations. As the changes have been gradual rather than abrupt, the population lends itself to looking at the effect of social change in a cross-generational study, such as this one, as each successive generation should have different sociodemographic characteristics and have experienced adolescence in different social ecologies. Moreover, the more traditional norms and ways of thinking are still available to each successive generation and different groups of adolescents. Thus, differences within generations, as well as between generations, might be attributed to different resources and accessibility to new ways of thinking and behaving (Pinquart & Silbereisen, 2004, 2005).

As social change over a long time period is hard to operationalise directly, this study takes as proxies for gradual social change three generations of women living in a rural village—adolescents, their mothers and their grandmothers—and two groups of adolescents from the same geographical region and cultural background who

live either in a rural or an urban area. The study cannot directly test the causal effect of social change, but results showing expected variation between generations and social ecologies would provide indirect evidence for causal relations that would be predicted by Greenfield's (2009) theory.

The Arab community in transition in Israel

Over the course of three generations, what was a largely rural population has become increasingly urban. In the early 1980s, half of the Arab population lived in localities numbering less than 10,000 people; in 2008, only about 30% did so.¹ From 1990 to 2010, postsecondary education rose 19% among Arab women and 11% among Arab men. From 1986 to 2000, there was an increase among Arab families in ownership of goods such as videocassette recorders (11–38%), at least one phone line (33–85%) and at least one car (9–46%). The use of communication technologies has risen, especially in the last decade. In 2000, 21% of Arab families had a computer in the home; that number rose to 63% in 2010. In that same time period, Internet subscriptions rose 37%. Thus, in the period from when mothers of today's adolescents were themselves adolescents until today, there have been great shifts in the sociodemographic ecologies of the Arab community.

In addition to internal changes within the Arab community, the wider culture has a likely influence on social change in the Arab community, as younger people have greater access to an urbanised, technological and diverse world (Gavison & Abu-Ria, 1999). The Arabs, a majority in the land before Israeli statehood in 1948, are now a minority of 21% within Jewish Israel, a *Gesellschaft*-oriented society with a heterogeneous population comprised of multiple ethnic, immigrant and cultural groups.

Hypotheses

This study is the second component of an earlier study with the same sample that focused on changing values concerning gender roles and cross-sex relations (Weinstock, Ganayiem, Igbariya, Manago, & Greenfield, 2015). The adolescent girls in the sample reported sociodemographic characteristics, including greater exposure to diverse people and ideas, more in the *Gesellschaft* direction compared with their mothers and grandmothers. In addition, adolescent girls in the city were more likely to have *Gesellschaft* sociodemographic characteristics than those in the village. In both comparisons, those with more *Gesellschaft* sociodemographic characteristics held values for gender roles and cross-sex relations that

emphasised egalitarianism and personal choice, rather than for hierarchy or ascribed roles. The hypotheses in this study are consistent with those findings and suggest that epistemic thinking would be related to values for gender roles and cross-sex relations.

- (1) As the adolescent girls have grown up in a more *Gesellschaft* ecology than either their mothers or grandmothers, it was predicted that they would have more subjectivist epistemic thinking and a greater orientation to knowledge from impersonal, scientific sources, as opposed to social sources and traditional knowledge.
- (2) Urban adolescent girls were hypothesised to have more subjective epistemic thinking and a greater orientation to impersonal, scientific knowledge sources than their rural peers.
- (3) Sociodemographic characteristics were hypothesised to account for the differences between groups (across generations, rural/urban). This is tested through mediation analysis, in which it is assumed that the relationships found between group and epistemic thinking will be mediated by sociodemographic characteristics.
- (4) It was hypothesised that epistemic thinking would be correlated with gender role/cross-sex relation values such that those with more *Gesellschaft*-adapted values would have more subjective, science-oriented epistemic thinking.

METHODS

Participants

Twenty adolescent girls (age: $M = 16.68$, $SD = 0.78$) from an Arab Muslim village in northern Israel participated in the research along with their 20 mothers (age: $M = 46.60$, $SD = 6.02$; range, 36–60 years), their 20 maternal grandmothers (age: $M = 66.95$, $SD = 7.84$; range, 52–80 years), and 20 similarly aged Muslim adolescent girls from a mixed Jewish, Arab Muslim and Arab Christian city (Haifa) from the same administrative district in northern Israel (age $M = 17.23$, $SD = 0.54$). Haifa is a mixed city consisting primarily of Jews, but includes about 10% Arabs, a bit less than half of whom are Muslims.

The urban sample was recruited at an Arab high school in Haifa through a process of snowball sampling. It is a private school that was historically Christian and is still run by a Greek Orthodox religious council. Today, this Arab high school includes diverse religious groups: Muslims, Christians and Druze; Muslims were in the majority. All of the participants from this school were

¹Statistical information is based on documents of Israel's Central Bureau of Statistics, http://www1.cbs.gov.il/reader/cw_usr_view_Folder?ID=141, some summarised by the Myers-JDC-Brookdale Institute, <http://brookdale.jdc.org.il/?CategoryID=182>

Muslim. Individual interviews were carried out in a park near the school.

The village sample was studying at a regional high school with a homogeneous population of Arab Muslims. The region includes five villages in north-central Israel, a region that is primarily Arab. The high school girls from the village were recruited by telephone through a process of snowball sampling. They then asked their mothers and grandmothers if they would also participate. If all three were willing, they were interviewed in their homes. Each member of the family was interviewed individually in a separate room of the house or, in the case of the grandmothers, usually in a separate house. Interviews in the same house were carried out in rapid succession to avoid discussion between participants of different generations.

In the village, all but 2 of the 20 mothers and all of the grandmothers were homemakers. As for the men in the families, the dominant occupation was construction, including 10 of the fathers and 9 of the grandfathers. As for education, 5 of the mothers had elementary school education, 14 had high school education, and 1 had undergraduate education. Among the grandmothers, six had elementary school education, and the rest had no formal secular education. Fifteen of the fathers had a high school education with two having done postsecondary studies. The other three fathers had elementary school education. Just two of the grandfathers had high school education, the highest level in that generation. In contrast, although they were not interviewed for this study, all of the parents of the urban sample had at least high school education, with six mothers and seven fathers having postsecondary education. To provide some context, from 1949–1968, education was compulsory from kindergarten to grade 8. This period would have been when the grandmothers were growing up. Compulsory education was extended to grade 10 between 1968 and 2007; this would have been when the mothers were growing up. In 2007, compulsory education was further extended to grade 12; this would have been when the adolescents were growing up. In Arab elementary, middle and high schools, Arabic is the language of instruction. The language of most institutions of higher education is Hebrew.

The girls received the equivalent of \$12 (U.S. dollars); the mothers, the equivalent of \$17; and the grandmothers, the equivalent of \$20 as compensation for their participation.

Materials

The adolescents responded to a sociodemographic interview that was designed to gain information regarding parents' work and education, number of siblings and their work and education, opportunity for interaction with diverse groups of people through local or international travel, household belongings, personal mobile technology, media use, contact with boys and non-Muslims,

and religious practice. The mothers and grandmothers responded to a similar interview that also included retrospective reports, where pertinent, of when they were adolescents, as well as self-reports of their work and education.

Following the sociodemographic interview, all of the participants responded to a semistructured interview task that presented 15 dilemmas concerning conflicts around gender roles, cross-sex relationships and epistemic thinking. Weinstock et al. (2015) reported on the nine dilemmas that concerned gender roles and cross-sex relationships. In this article, the author report findings from the six dilemmas concerning epistemic issues, but relate the two sets of dilemmas in the last analysis reported here.

The model for the dilemmas was a study on an indigenous Maya community in Chiapas, Mexico that looked at gender roles and cross-sex relationships (Manago, 2014). In order to attain cultural validity, the epistemic dilemmas were developed primarily by two of the authors on the related study (Weinstock et al., 2015), one from the same village and the other having studied at the same urban high school as the adolescent participants in the study. The dilemmas presented points of potential conflict; it was assumed that some participants would agree with the more *Gemeinschaft*-adapted viewpoint of one character in the dilemma, whereas others would agree with the more *Gesellschaft*-adapted viewpoint of a different character in the dilemma.

The topics of the six epistemic dilemmas (with the overall issue in parentheses) included in this study are: (a) home remedy (tradition vs. schooling as source of knowledge), (b) feeding guests (social custom vs. impersonal knowledge as guide to behaviour), (c) causes of colds (authority vs. individual as source of knowledge), (d) adolescent girl wanting to study at university (social, practical vs. personal, theoretical knowledge), (e) men working with women (religious authority vs. individual experience as source of knowledge), (f) spicy food (single vs. multiple perspectives). As an example, here is the *men working with women* dilemma:

Ahmed works in a company in the city. In this company, men and women work together all the time. Ahmad wonders if he should leave his job or stay, because there are women who work together with him in the office, and he is a religious man. He asks the Imam who tells him that it is forbidden for men and women to work together in the same office, because they might want unnecessary contact. Ahmed says to the Imam, "From my experience I have seen men can control themselves in front of women. It's not always like that."

Which is better, that Ahmed accept what the Imam said as true or that he insists on what he thinks?

All six dilemmas are shown in Appendix S1, Supporting Information.

Procedure

The interviews were conducted in Arabic by female research assistants. Each participant was interviewed individually at her home or in the park in a single session. The interviews took 40 to 60 minutes.

Data analysis

Because written Arabic and spoken Arabic are quite dissimilar, the interviews were transcribed into the vernacular Arabic, rather than the more literary written Arabic, before being translated into Hebrew. The Hebrew translation was used to facilitate the development of the coding with the participation of non-Arabic-speaking researchers. The Arabic transcripts were used for interrater reliability and the final coding.

The dilemmas were coded for tendency towards agreement with the *Gemeinschaft*-oriented character, the *Gesellschaft*-oriented character, or a position in between. The score of 1 meant that the participant had chosen the response representing a *Gemeinschaft* mode of epistemic thinking (heretofore called “objectivist”). An example of a response coded as 1, from the men working with women dilemma (e), is: “I think Ahmed should accept what the Imam said because the Imam knows what the religion says.” A score of 3 meant that the participant had chosen the response representing a *Gesellschaft* mode of epistemic thinking (heretofore called “subjectivist”). An example of the 3 score, from the men working with women dilemma, is: “Ahmed can know if he can control himself so he can decide.” A score of 2 meant that participants agreed with both possibilities in the story and does not decide clearly which perspective was better. An example of the 2 score is “I think that Ahmed can stay at his job, but he should try to stay away from women there.” For interrater reliability, two mother-tongue Arabic-speaking raters coded 20 of the transcripts independently and had sufficient agreement on all six dilemmas with weighted Kappa scores ranging between .70 and 1.00. The raters subsequently coded all dilemmas together and reached consensus regarding disagreements. The overall epistemology score used in the statistical analysis was the mean score of all the epistemic dilemmas.

RESULTS

Cross-generational analysis

Because of missing data for some of the dilemmas, the epistemology scores of 18 of the adolescents and 17 of each the mothers and grandmothers were included. An analysis of variance (ANOVA), used to test the first hypothesis, found a significant difference across

TABLE 1
Sociodemographic characteristics found correlated with both group and epistemology scores

<i>Sociodemographic characteristics</i>	<i>Group</i>	<i>Dilemma scores</i>
Cross-generation analysis		
Mother's education	−0.71***	0.66***
Father's education	−0.71***	0.63***
Number of siblings	0.42***	−0.50***
Watches non-Arabic TV	−0.45***	0.32**
Has personal mobile technology ^a	−0.24*	0.38**
Responds to five calls to prayer	0.45***	−0.39**
Travels outside village ^b	−0.44***	0.41**
Rural/urban analysis		
Mother's education	0.38**	0.37**
Father's education	0.29*	0.38**

Notes: Correlations are calculated with Kendall's *Tau-b*. Generation: daughter = 1, mother = 2, grandmother = 3; rural/urban: rural = 1, urban = 2. Dilemma score: objectivist = 1, objectivist and subjectivist = 2, and subjectivist = 3.

^aNumber of the following: laptop, cell phone and internet on cell phone. ^b0 = no, 1 = 1–3 times/month, 2 = 4–5/month, 3 = more than 4–5/month, 4 = every day. * $p < .05$. ** $p < .01$. *** $p < .001$.

generations in epistemology, $F(2, 49) = 8.24$, $p = .001$, $\eta_p^2 = .25$. Bonferroni *post-hoc* comparisons found significant differences between the means at each level with adolescents ($M = 2.54$, $SD = 0.41$) more subjectivist than both mothers ($M = 2.14$, $SD = 0.34$, $p = .017$) and grandmothers ($M = 2.00$, $SD = 0.46$, $p = .001$).

To test if sociodemographic characteristics mediated the relationship between generation and epistemology score, a bootstrapping mediation analysis with bias correction was used. This analysis, a nonparametric test, was used because it is suitable for small samples, can test for multiple mediation, allows for categorical variables and has been shown to be an improvement over parametric tests even with larger samples (Fritz & MacKinnon, 2007; Preacher & Hayes, 2004). Table 1 shows the characteristics that were correlated with both the independent variable (generation) and the dependent variable (epistemology). Collinearity statistics indicated that there was not multicollinearity among the predictor variables.

The regression including all of the variables was significant, $F(8.43) = 5.04$, $p = .0002$. The model explains 39% of the variability, an increase from 17% without including the sociodemographic variables with generation. Although the total effect of generation on epistemology score is significant, $\beta = -.27$, $t(50) = 3.90$, $p = .0003$, without separating out the sociodemographic variables, the direct effect of generation is not significant, $\beta = .23$, $t(43) = 1.74$, $p = .089$, when they are added. The fact that the direct effect of generation on epistemology score became non-significant when controlling for the sociodemographic variables suggests that, as a whole, the sociodemographic variables might mediate the relationship between generation and epistemology. To ascertain if the sociodemographic variables do mediate

the relationship between generation and epistemology, the 95% confidence interval (CI) of the indirect effect of generation on epistemology was obtained (Preacher & Hayes, 2004) with 5000 bootstrap samples. With an indirect effect of -0.48 , the 95% CI did not include 0 ($-0.76 < CI < -0.33$), which confirms that the mediation is significant. As for individual sociodemographic variables, mother's education, $\beta = .24$, $t(43) = 2.10$, $p = .042$, had a direct effect on epistemology score, when taking generation into account, suggesting that the relationship between generation and epistemology score might be fully mediated by mother's education. However, the indirect effect of generation on epistemology score through the mediator of mother's education (-0.194) was not quite significant as the 95% CI just included 0 ($-0.40 < CI < 0.01$). Although its relationship with epistemology score was short of significance ($p = .075$), the CI with father's education did not include 0 (indirect effect = -0.14 ; $-0.31 < CI < -0.01$). No other individual sociodemographic appeared to be significant mediators.

This result supports Hypothesis 3 that sociodemographic characteristics account for differences in epistemic thinking between the generations with parents' education appearing to play the strongest explanatory role.

Rural/urban analysis

As there were some missing data, the epistemology scores of 18 of rural and 19 of urban adolescents were included. An independent-samples *t*-test tested the second hypothesis and did not find a significant difference between groups in epistemology score. The means of both the rural ($M = 2.54$, $SD = 0.41$) and urban ($M = 2.65$, $SD = 0.21$) adolescents indicate that both groups tended towards subjectivist thinking.

As there was no relationship between rural/urban residence and epistemology score, the test for mediation was not conducted. However, as can be seen in Table 1, two of the sociodemographic variables, mother's and father's education, were positively correlated with both urban residence and subjectivist epistemology.

Epistemology and gender role/cross-sex relations dilemma scores

Gender role/cross-sex relation scores were taken from the other nine dilemmas reported by Weinstock et al. (2015). These scores correlated with epistemology score ($r = 0.41$, $p = .001$) in the direction expected: those with more *Gesellschaft*-adapted epistemologies also tended to have more *Gesellschaft*-adapted values regarding gender roles (egalitarian rather than hierarchical) and cross-sex relations (individual rather than family chooses romantic partner). A bootstrapping mediation analysis found that

epistemology mediated between generation and gender role/cross-sex relations scores. The overall model, with generation as the independent variable, epistemology as a mediator, and gender role/cross-sex relation score as the dependent variable, was significant, $F(2,49) = 5.91$, $p = .005$, explaining 16% of the variability compared with 10% of variability explained by generation alone. Consistent with mediation, the total effect of generation on gender role/cross-sex score without considering epistemology was significant, $\beta = -.15$, $t(50) = -2.63$, $p = .011$, but the direct effect of generation was not significant, $\beta = -.09$, $t(49) = -1.36$, $p = .18$, when including epistemology score. The CI of the indirect effect of generation through the mediation of epistemology (0.07) indicated that epistemology fully mediates the relationship between generation and gender role/cross-sex values ($-0.16 < CI < -0.01$). (The important note is that an analysis with gender roles/cross-sex relation scores as potential mediator between generation and epistemology was not significant.)

In the rural/urban analysis, epistemology score was found correlated with gender role/cross-sex relations score ($r = 0.42$, $p = .005$) in the direction expected: those with *Gesellschaft*-adapted epistemologies also tended to have *Gesellschaft*-adapted values regarding gender roles and cross-sex relations. As epistemology score was not correlated with rural/urban, no mediation analysis was performed.

DISCUSSION

The results support the overall assumptions of the research that (a) epistemic thinking would differ according to social ecology, (b) sociodemographic characteristics predict epistemic thinking, and (c) assuming that comparisons among the generations and between adolescents living in rural versus urban environments are good proxies for social change, epistemic thinking would become more subjectivist with shifts towards *Gesellschaft* ecologies. These findings suggest that the description of epistemic development derived from previous studies in epistemic thinking in fact describes a pathway of epistemic development adaptive to a *Gesellschaft* ecology, but does not describe a universal development.

In contrast, these results are in accordance with the finding that first-generation Maya university students perceived a transition from absolute norms in their natal villages, with limited schooling, to multiple norms in their current urban environment (Manago, 2012). This pattern suggests that specific changes in epistemic thinking, that is, the acceptance of multiple knowledge perspectives, might be brought about both by extended formal schooling, as well as by an urban ecology that provides more exposure to diversity. More generally, the findings also complement other research demonstrating that cognitive

(Greenfield, 2009; Greenfield, Maynard, & Childs, 2003; Saxe & Esmonde, 2005) as well as social (Manago, 2012, 2014; Weinstock et al., 2015) development is intrinsically intertwined with social change.

That epistemology was related to gender role/cross-sex relations values, and in particular, the fact that it mediated the relationship between generation and values suggests a possible ordered relationship. Perhaps, understanding that there may be discrepant legitimate perspectives and that it is up to the individual to evaluate competing claims leads to consideration of alternative gender roles and norms for cross-sex relations. It is reasonable that the direction could be reversed, and that having to confront multiple gender role and cross-sex relations values would produce epistemic change. However, the model with epistemology as a mediator was statistically significant, while the model with gender and cross-sex values as a mediator was not. This pattern of results suggests that subjectivist epistemology leads to questioning hierarchical gender roles and family choice of partners and that beliefs in egalitarian gender roles and personal choice of romantic partners are the outcome. Moreover, this finding agrees with Pinquart and Silbereisen (2004) that, in situations of social change, qualities such as non-conventional thinking and tolerance of ambiguity—characteristics consistent with subjective epistemic thinking—would better allow for taking new developmental paths. Moreover, although epistemic thinking is not the type of mediator that they had in mind, this finding also follows their suggestion of the importance of identifying variables that might mediate the relationship between social change, such as that indicated by generation, and psychological factors, such as values regarding gender roles and cross-sex relations.

The study also points to parents' education above and beyond other relevant sociodemographic characteristics as a motor of epistemic change. With each analysis, both parents' education levels showed to be a meaningful predictor or correlate of epistemic thinking. This is perhaps a less obvious direct influence on subjective epistemic thinking through exposure to diversity than having mobile technology, travelling outside of one's village or Israel, having friends from diverse backgrounds, or even watching non-Arabic television. As formal education is a central component of a *Gesellschaft* ecology, it might simply be a good representative of *Gesellschaft* in general. But there might also be specific characteristics of formal schooling that promote epistemic change. Within *Gemeinschaft* environments, schools are somewhat apart in fostering psychological change and change in the child's symbolic culture (Greenfield, 1997; Greenfield & Bruner, 1966). Manago (2012, 2014) also posits formal schooling as a particular site of social change because of its emphasis on the self, providing a centre of activity away from the family and a greater exposure to diverse people and ways of thinking. The changes in parents' thinking through their schooling might then be

transmitted to their children. Although there has been little research regarding the relationship between parents' education and their children's epistemic thinking, studies on theory of mind, an antecedent of a subjectivist epistemology (Kuhn & Weinstock, 2002), have found that maternal education is related to early attainment or precursors of theory of mind (Adrian, Clemente, Villanueva, & Rieffe, 2005; Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003).

While the pathway of development may differ across ecologies, it is likely that people in every ecology confront uncertain knowledge and conflicting knowledge claims. How people in different cultures make sense of uncertain and conflicting knowledge rests on defining issues in cultural psychology. For instance, the idea of a subjective mode of epistemic thinking—that essentially individuals create their knowledge or are responsible to their own knowledge—invokes the independent self (Markus & Kitayama, 1991). Thus, looking at evolving epistemologies would seem to be intertwined with shifting views of self that would be predicted by Greenfield's (2009) model.

A limitation of this study is that it does not delve as deeply into the epistemic development of those who grew up in a *Gemeinschaft* ecology as does the body of research regarding epistemic thinking in *Gesellschaft* ecologies. A future, more open-ended study could focus on finer details of epistemic development in a *Gemeinschaft* environment. Future research should also track the longitudinal process by which cultural epistemology evolves with global pressures of social change.

Some bases for the dilemma choices might seem to depart from what is commonly assessed in the domain of epistemic thinking. However, each dilemma involves culturally relevant conflicting claims that refer to knowledge. Whether the participants consider the claims to be about knowledge, social norms or cultural ethics may be specific to the culture's epistemological orientation.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix S1: Epistemic thinking dilemmas.

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