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COGNITIVE DEVELOPMENT

The development of epistemological understanding

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Abstract

We propose the coordination of the subjective and objective dimensions of knowing as the essence of what develops in the attainment of mature epistemological understanding. Initially, the objective dimension dominates, to the exclusion of subjectivity; subsequently, the subjective dimension assumes an ascendant position and the objective is abandoned, and, finally, the two are coordinated. This progression, we further postulate, tends to occur in a systematic order across different judgment domains (personal taste, aesthetic, value, and truth), with the orders the reverse of one another in the two major transitions that constitute this progression. These predictions are supported among a sample of seven groups of children, adolescents, and adults varying in age, education, and life experience. Subjectivity is most readily acknowledged in personal taste and aesthetic judgments and least readily in truth judgments. Once subjectivity is accepted and becomes dominant, objectivity is reintegrated in the reverse order, i.e., most readily with respect to truth judgments. Not predicted, however, was the finding that for a number of individuals, both transitions proved most difficult in the values domain.

Keywords: Epistemology; Knowing; Subjectivity; Objectivity; Truth; Judgement; Belief

Beliefs about knowing and knowledge are potentially important determinants of intellectual performance. It is not surprising that what people believe about the

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acquisition of knowledge — how it occurs and what it accomplishes — influences its operation in their own lives. Empirical investigation of epistemological beliefs, however, has not been widespread and has received relatively little attention in the mainstream of developmental psychology, despite increasing interest on the part of developmental psychologists in the educational implications of their research.

A recent review article by Hofer and Pintrich (1997) summarizes disparate lines of research on the topic and seeks common threads. In the present article, we undertake to advance the conceptual progress represented by Hofer and Pintrich's article. Doing so leads to several hypotheses, which we test empirically. While in broad agreement with the three major levels of epistemological understanding that Hofer and Pintrich identify (see Table 1 for our rendering of this progression, which, in addition to the three levels they identify, includes a preabsolutist level characteristic of early childhood), we seek a better understanding of the dimensions that define these levels and how they connect to one another. To identify the dimensions that best characterize any developmental evolution, it is necessary to understand at a more fundamental level what it is that is developing and why. This objective should include the identification of developmental origins, as well as endpoints.

1. What develops?

We propose that the developmental task that underlies the achievement of mature epistemological understanding is the coordination of the subjective and objective dimensions of knowing. Initially, the objective dimension dominates, to the exclusion of subjectivity. Subsequently, in a radical shift, the subjective dimension assumes an ascendant position and the objective is abandoned. Finally, the two are coordinated, with a balance achieved in which neither overpowers the other.

This progression is reflected in the sequence of levels depicted in Table 1. Someone at the absolutist (as well as the preabsolutist realist) level sees knowledge as an objective entity, as located in the external world and knowable with certainty. In what we take to be a key event in the development of epistemological thought, the multiplist relocates the source of knowledge from the known object to the knowing subject, hence becoming aware of the uncertain, subjective nature of knowing. This awareness comes to assume such proportions, however, that it overpowers and obliterates any objective standard that could serve as a basis for comparison or evaluation of conflicting claims. Because claims are subjective opinions freely chosen by their holders and everyone has a right to their opinion, all opinions are equally right.

The evaluativist reintegrates the objective dimension of knowing, by acknowledging uncertainty without forsaking evaluation. Thus, two people can both have legitimate positions — can both "be right" — but one position can have more

Table 1
Levels of epistemological understanding

Level	Assertions	Reality	Knowledge	Critical thinking
Realist	Assertions are COPIES of an external reality.	Reality is directly knowable.	Knowledge comes from an external source and is certain.	Critical thinking is unnecessary.
Absolutist	Assertions are FACTS that are correct or incorrect in their representation of reality (possibility of false belief).	Reality is directly knowable.	Knowledge comes from an external source and is certain.	Critical thinking is a vehicle for comparing assertions to reality and determining their truth or falsehood.
Multiplist	Assertions are OPINIONS freely chosen by and accountable only to their owners.	Reality is not directly knowable.	Knowledge is generated by human minds and is uncertain.	Critical thinking is irrelevant.
Evaluativist	Assertions are JUDGMENTS that can be evaluated and compared according to criteria of argument and evidence.	Reality is not directly knowable.	Knowledge is generated by human minds and is uncertain.	Critical thinking is valued as a vehicle that promotes sound assertions and enhances understanding.

merit (“be more right”) than the other to the extent that position is better supported by argument and evidence.

Conceptualizing the developmental endpoint or goal of epistemological understanding as the coordination of subjective and objective dimensions of knowing is helpful in tracing its developmental origins, an endeavor facilitated by the recent wave of research on children’s theory of mind. The origins of the coordination process we have referred to are in fact identifiable in the early childhood achievements highlighted by theory-of-mind researchers. Children by age three show some epistemological awareness in making reference to their own knowledge states, using verbs such as *think* and *know* (Olson & Astington, 1986). However, much evidence now exists suggesting that children below the age of about four regard people’s claims as isomorphic to an external reality. The most familiar source of evidence for this characterization is young children’s poor performance in the now classic false-belief task. Three-year-olds believe that a newcomer will share their own accurate knowledge that a candy container in fact holds pencils (Perner, 1991; Wimmer & Perner, 1983). It is impossible that the other person could hold a belief that the child knows to be false.

Less widely cited is the finding that this refusal to attribute false knowledge to another extends beyond the realm of factual knowledge to values, social conventions, and moral rules that the child takes to be valid or true claims. In a study by Flavell, Mumme, Green, and Flavell (1992), preschool children were told, for example, about a girl Robin who thinks that it is okay to put her feet on the dinner table and then immediately asked, “Does Robin think that it is okay to put her feet on the dinner table?” Strikingly, a majority of 3-year-olds responded negatively to such questions, as well as to parallel questions about whether someone could hold nonnormative beliefs regarding moral rules (e.g., breaking a toy), values (e.g., eating grass), and facts (e.g., whether cats can read books). Performance improved (although remaining below ceiling) among 4-year-olds.

Beginning at about age four, children come to recognize assertions as the expression of someone’s belief — a milestone in their cognitive development that lays the way for further achievement in epistemological understanding. This initial connection of knowing to its subjective or human source, with its implication that assertions do not necessarily correspond to reality, renders assertions susceptible to evaluation vis-à-vis the reality from which they are now distinguished. Although this progression from a preabsolutist, or realist, level to the initial absolutist level of epistemological understanding achieves no more than the capacity for simple comparison of an assertion to an alleged reality and declaration of it as true or false, it is a critical step in the development of epistemological understanding — a transition from simple, unconscious, unreflective knowing about the world to a second-order, or metacognitive, reflection on the knowing claims of self and others (Kuhn, 1999b).

Once the false-belief concept is fully developed, and the products of knowing connected to their generative source, a child of five or six would appear to be well on the way to the multiplist epistemological level, in which conflicting beliefs are

accepted as the legitimate product of people's differing experiential and knowing histories. Children of this age, however, appear to have not progressed sufficiently in locating the source of knowing in the knower rather than the known to understand differences in knowledge claims as legitimate reflections of the subjective dimension of knowing. Instead, they remain at an absolutist level of epistemological understanding, with knowledge claims judged exclusively against a standard of truth dictated by an objective external reality: To the extent others judge differently than I do, it is because they are in a state of misinformation or misunderstanding; they have not seen the reality that is there to be seen. By school age, children recognize that exposures to different information may lead to different knowledge claims (Taylor, Cartwright, & Bowden, 1991). The source of these differences, however, remains firmly fixed in the external world. There exists a single, externally defined reality, which, once apprehended, yields only one valid conclusion. If we come to different conclusions, it is because one of us fails to have the full or correct story.

It is not until some time later that there begins to emerge a "constructivist theory of mind" (Carpendale & Chandler, 1996; Pillow & Henrichon, 1996). Conflicting representations of the same event come to be understood as legitimate products of individuals' unique meaning-making efforts — because interpretive mental processes vary across individuals, their products may also differ. It is at this point that the multiplist level of epistemological understanding begins to take hold: Perhaps all knowing is only opinion.

Remaining is the most fragile developmental transition — the one that may never be achieved — from embrace of the multiplist equation of all claims as equally valid reflections of their owners' subjective perspectives to the reintegration of objectivity into knowing, the latter reflected in the evaluativist's belief that, despite the respect accorded to people's rights to their own views, criteria exist for judging some claims to have more merit than others.

2. Epistemological understanding across judgment domains

The preceding account of the developmental origins and subsequent evolution of epistemological understanding led us to the question of whether the transitions from absolutist to multiplist and from multiplist to evaluativist levels of epistemological understanding occur in a domain-dependent manner. In other words, if the developmental task is one of coordinating the subjective and objective dimensions of knowing, it is possible that this coordination is more readily achieved with respect to some kinds of judgments than others. The kinds of knowing judgments that people make are of different types. Here we distinguish judgments of *pleasingness* (personal taste), of *beauty* (aesthetic judgments), of *good* (value judgments), and of *truth*, while acknowledging that other categorizations are possible and that there exist both philosophical and psychological connections across these domains (Chandler, Sokol, & Wainryb,

2000). The *truth* category we further differentiate into truth judgments about the social world and truth judgments about the physical world.

The developmental task, recall, is different at each of the transitions in epistemological level. In the transition from absolutist to multiplist levels, the task is to recognize the subjective dimension of knowing. Here we hypothesize the order of acquisition listed above: Subjectivity is first recognized in judgments of personal taste, next in aesthetic judgments, next in value judgments, next in social truth judgments, and finally in physical truth judgments. Human subjectivity is arguably most salient in matters of personal pleasingness or taste. Recognizing this subjectivity may follow from young children's observation that people have different emotional reactions to the same event. Aesthetic judgments may follow, as having a strong component of personal preference. Value (including moral) judgments, in contrast, may be a domain in which the concept of absolute standards is not as readily relinquished. Lastly, judgments of truth may be the most difficult judgment domain in which to forego the concept of a single absolute truth and to accept that conflicting claims may both have some truth, especially in judgments pertaining to the physical world.

In the transition from multiplist to evaluativist, in contrast, the developmental task is one of recognizing and reintegrating the objective dimension of knowing. Here an order of attainment exactly the reverse might be predicted. It may be easiest to recognize the possibility of objective criteria (in the face of multiplicity of views) in the domain of truth judgments: Scientists are recognized as having divergent views, but evidence suggests one scientist's model to be more accurate (''closer to the truth'') than another's, with the further possibility of such distinctions being more readily accepted when claims are about the physical world than when they are about the social world. Values may be the next easiest judgment domain in which to progress beyond the radical relativism of the multiplist to embrace objective criteria for comparison of divergent views (can some behaviors be judged less moral than others, despite their acceptability within the cultural groups that practice them?), with aesthetic judgments more difficult still in this respect (can one legitimately regard one art work as objectively superior to another?). Finally, personal taste is a judgment domain where it would be predicted that this transition would fail to occur at all: There is little if any basis for judging one person's personal tastes as having more merit than another's. In this judgment domain, we all can (and should) remain content to be multiplists.

The predicted orders for the two major transitions in the development of epistemological understanding, then, are exactly the reverse of one another. Testing this set of predictions is one objective of the present research.

3. Assessment

Consistent with our conceptualization of the essence of developing epistemological understanding as the coordination of objective and subjective dimensions

of knowing, the instrument we constructed to assess epistemological understanding was designed to focus on what we propose to be the key elements in achieving this coordination for each of the transitions (from absolutist to multiplist and from multiplist to evaluativist) examined. To assess the transition from absolutist to multiplist, two contrasting claims within a particular knowledge domain are presented and the individual is asked whether only one could be right or whether "both could have some rightness," with the first option taken as indicating an absolutist level of epistemological understanding. To assess the transition from multiplist to evaluativist (given the second option is chosen in response to the initial question), the individual is asked whether one judgment (regarding the same knowledge object) might be regarded as having more merit than another.

The resulting simplicity of the instrument, while sacrificing examination of many of the nuances and range of thinking about epistemological issues, has the practical advantage of making it feasible to assess epistemological understanding across multiple kinds of judgments and content. In addition, its simplicity makes it more appropriate for children than the long and complex interview format in which epistemological thinking has typically been assessed. More fundamentally, however, it offers the theoretical benefit of conceptual (as well as empirical) clarity as to what is being alleged to develop.

4. Study 1

4.1. Method

4.1.1. Participants

Since previous research suggests that epistemological understanding may be highly sensitive to education and broad life experience, as well as age (Hofer & Pintrich, 1997, in press), we included in our sample multiple adult groups varying along these dimensions, as well as younger groups covering the period from middle childhood through adolescence. All groups included both genders.

The three younger groups were fifth ($n = 20$, median CA 10 years), eighth ($n = 25$, median CA 13 years), and twelfth ($n = 21$, median CA 17 years) graders from a school system in a small rural community serving a lower-middle to middle-class, predominantly Caucasian population.

The young adult group ($n = 20$) were undergraduate students (age range 18–21) at a highly selective urban private university. This group was chosen to be of high intellectual ability but limited life experience.

Two mature adult groups were chosen to be older and in possession of a richer background of life experience, relative to the undergraduates. One of the mature groups was chosen to be of comparable intellectual ability to the young adult group; the other was of assumed lesser ability. The objective in choosing these groups to examine was to begin to tease apart the influences of age, intellectual ability, and life experience on epistemological understanding.

The two mature groups were of an equivalent age range (mid twenties to late thirties). The community college group ($n = 20$), primarily of Hispanic ethnicity, were enrolled in largely vocational programs at an urban public community college serving an inner-city, low-income population. The professional group ($n = 18$) were enrolled in a highly selective part-time degree program for business executives (Executive MBA) at a major business school, in addition to holding high-level full-time positions in the business world. They were of predominantly Caucasian ethnicity.

Finally, an expert group ($n = 5$), comparable in age to the mature adult groups, were PhD candidates in educational philosophy. These people had extensive academic backgrounds that included the study of epistemological and related philosophical issues, and we assumed that they would exhibit the highest levels of attainment that could be expected with respect to epistemological understanding.

4.1.2. Instrument

The 15 items included in the assessment instrument are presented in Table 2, organized by domain. Order was randomized, however, in the instrument presented to participants. Each item consisted of a pair of contrasting statements attributed to two individuals, Robin and Chris. Following each pair of statements, this question was posed:

Can only one of their views be right, or could both have some rightness?

Response options for this question were as follows:

ONLY ONE RIGHT
BOTH COULD HAVE SOME RIGHTNESS (circle one)

The immediately following second question, which was contingent on the response to the first, was as follows:

IF BOTH COULD BE RIGHT:

Could one view be better or more right than the other?

ONE COULD BE MORE RIGHT
ONE COULD NOT BE MORE RIGHT THAN THE OTHER (circle one)

Administration occurred in small groups, with a researcher available to answer questions as needed. All participants easily completed the 15-item instrument in a 10- to 20-min period.

4.2. Results

4.2.1. Patterns of performance across judgment types

As our primary concern is the patterns of performance shown across judgment types, we focus on this question initially, looking at the sample as

Table 2
Assessment items by domain

Judgments of personal taste
Robin says warm summer days are nicest. Chris says cool autumn days are nicest.
Robin says the stew is spicy. Chris says the stew is not spicy at all.
Robin thinks weddings should be held in the afternoon. Chris thinks weddings should be held in the evening.
Aesthetic judgments
Robin thinks the first piece of music they listen to is better. Chris thinks the second piece of music they listen to is better.
Robin thinks the first painting they look at is better. Chris thinks the second painting they look at is better.
Robin thinks the first book they both read is better. Chris thinks the second book they both read is better.
Value judgments
Robin thinks people should take responsibility for themselves. Chris thinks people should work together to take care of each other.
Robin thinks lying is wrong. Chris thinks lying is permissible in certain situations.
Robin thinks the government should limit the number of children families are allowed to have to keep the population from getting too big. Chris thinks families should have as many children as they choose.
Judgments of truth about the social world
Robin has one view of why criminals keep going back to crime. Chris has a different view of why criminals keep going back to crime.
Robin thinks one book's explanation of why the Crimean wars began is right. Chris thinks another book's explanation of why the Crimean wars began is right.
Robin agrees with one book's explanation of how children learn language. Chris agrees with another book's explanation of how children learn language.
Judgments of truth about the physical world
Robin believes one book's explanation of what atoms are made up of. Chris believes another book's explanation of what atoms are made up of.
Robin believes one book's explanation of how the brain works. Chris believes another book's explanation of how the brain works.

(continued on next page)

Table 2 (*continued*)

Judgments of truth about the physical world
Robin believes one mathematician's proof of the math formula is right. Chris believes another mathematician's proof of the math formula is right.

a whole. Later, we examine performance across the differing age and experience groups.

The various patterns across judgment types that occur most frequently and account for the majority of participants of all subgroups are shown in Table 3, together with their frequencies of occurrence. A participant was categorized as conforming to the absolutist, multiplist, or evaluativist level for a particular judgment type if responses to two of the three items assessing that judgment type conformed to the pattern characterizing that level. In a very few cases in which all three patterns appeared across the three items, and therefore no pattern predominated, the intermediate, multiplist level was assigned.

To keep the table as simple as possible, the personal taste judgment type is omitted in Table 3, since the multiplist level (the highest expected, recall) is attained in this domain by the youngest age assessed in this study. Table 3 displays patterns across the four remaining judgment types — aesthetic judgments, value judgments, social truth judgments, and physical truth judgments, in that order. The most frequent patterns in Table 3, it can be seen, are ''pure'' types, e.g., consistently multiplist across all four domains. Other patterns reflect a mixture across levels. Of the 129 participants in the study, 107 (83%) showed patterns that we regarded as theoretically consistent and interpretable. It is these patterns and frequencies that are included in Table 3. We address nonconsistent patterns (any one of which was shown by at most two participants) subsequently.

Since more participants exhibit one of the transition patterns between the multiplist and evaluativist levels than between the absolutist and multiplist levels, the findings are more definitive with respect to the former transition and we begin with it. As reflected in the lower portion of Table 3, the sequence of attainment of the evaluativist level is largely in accordance with our predictions, with one qualification. A number of individuals show patterns that extend across all three levels (A, M, and E), indicating that absolutist thought may linger in some domains even after the individual has begun the transition to the evaluativist level in others. If we qualify the model to allow for this extended range of acquisition, what would otherwise be exceptions to the predicted sequence cease to be anomalies. Specifically, a number of participants show a pattern that departs from prediction only in that level in the physical domain remains absolutist, while the individual is otherwise in the midst of the transition from multiplist to evaluative (patterns MMEA and MEEA) or has even completed it (pattern EEEA).

Contrary to prediction, Table 3 shows there appears no difference between the two truth domains (physical and social) with respect to initial appearance of the

Table 3
Patterns of epistemological understanding across judgment domains

Pattern	Frequency of occurrence
AAAA	2
MAAA	1
MAMA	2
MAMM	9
MMMM	37
MMME	6
MMEM	5
MMEA	4
MAEA	1
MAEM	1
MEEA	3
MMEE	11
EEEA	2
MEEE	7
EMEE	3
EEEE	13
Total	107

The first letter in each pattern refers to epistemological level (A = absolutist, M = multiplist, E = evaluativist) in the aesthetic judgment domain; the second letter refers to level in the values domain, the third to level in the social truth domain, and the fourth to level in the physical truth domain. Only theoretically interpretable patterns (83% of participants, excluding experts) are included here. Predicted patterns are in boldface.

evaluativist level. It is roughly equally likely to occur in the social domain (pattern MMEM) as in the physical domain (pattern MMME).

Two other patterns, MAEA and MAEM, were not predicted and occur infrequently but are conceptually noteworthy in reflecting difficulty in relinquishing an absolutist belief (in certainty) in the realm of values while the individual is otherwise progressing from multiplist to evaluativist thought. A final unpredicted pattern, EMEE, suggests that the relinquishment of multiplist thought in the domain of values can similarly prove difficult.

Turning now to the upper portion of Table 3, we see that once the transition to multiplist thought is largely completed, clinging to absolutism in the realm of values, not truth, is in fact the dominant pattern, contrary to prediction. Again, then, the transition from the absolutist to multiplist levels in the values domain appears to be a troublesome one.

Regarding the initial emergence of the absolutist to multiplist transition, which domain multiplism is most likely to appear in first is a question that our data

cannot answer with any certainty, since so few participants show patterns that reflect the initial emergence of multiplist thought in only one or two domains. The three participants who cling to absolutism only in the truth or values domains (MAAA or MAMA) are countered by two (not shown in Table 3) who show other patterns (AAMA and MMAA). Our data do not allow us to choose between two possible explanations for these findings. One explanation is that we have not assessed a young enough age group to allow us to observe this transition when it may be most prevalent. A second explanation is one argued on theoretical grounds by Chandler, Boyes, and Ball (1990), namely that this transition occurs very rapidly; once the "well is poisoned," as Chandler et al. put it, by the acknowledgment of subjectivity, the movement toward the multiplist position of total subjectivity occurs very rapidly.

What can be concluded with respect to the other end of this developmental progression, when mature epistemological understanding would be predicted to be consolidated at the evaluativist level? While a significant number of people do appear to complete the transition to a consistently evaluativist level across all judgment domains (EEEE pattern), two other patterns in Table 3 are possible terminal levels or developmental endpoints at which adults stabilize — MEEE and EMEE. The more prevalent, MEEE, reflecting the view that aesthetic judgments are entirely subjective and lack any justifiable objective dimension, is perhaps less defensible, although it did appear in two of our five expert participants. The less prevalent, EMEE, reflecting the concept that values are entirely relative, however, is one that has been debated extensively and continues to have committed advocates in scholarly discourse in both philosophy and social sciences.

The 22 participants (17% of the sample) whose patterns are not included in Table 4 showed 15 different patterns, with no pattern exhibited by more than two individuals. The majority, 14 people, show patterns spanning only two levels, but with the particular pattern across domains different than any of those in Table 3. The remaining eight show patterns spanning all three levels, with the majority of these remaining at the absolutist level in only one domain while showing a mixture of multiplist and evaluativist thinking in the other domains, but, again, in a particular pattern different from any of those included in Table 3. These 22 cases most likely represent some combination of measurement error and genuine individual variation. In future research, it would be of interest to interview such individuals in more depth to distinguish these two possibilities.

4.2.2. Patterns of performance across age and experience groups

Patterns of performance by participant group are summarized in Table 4. The top portion of Table 4 shows the percentages of participants in each group who were classified as at a predominantly absolutist level (using the same criteria as apply in Table 3) for each judgment type. As reflected in Table 4, some members of all groups except the expert group remain at an

Table 4
Epistemological levels across judgment domains by participant group

	Judgment domain				
	Taste	Aesthetic	Value	Social truth	Physical truth
Percentages of participants showing a predominantly absolutist level					
Fifth grade	–	–	30	–	30
Eighth grade	–	–	16	–	12
Twelfth grade	–	14	33	14	19
Undergraduate	–	–	–	–	10
Community college	–	10	10	–	10
Professional	–	–	–	–	22
Expert	–	–	–	–	–
Percentages of participants showing a predominantly evaluativist level					
Fifth grade	10	–	10	35	20
Eighth grade	16	16	20	40	32
Twelfth grade	19	29	29	39	38
Undergraduate	25	25	45	45	40
Community college	35	10	25	40	45
Professional	11	–	22	50	44
Expert	20	60	80	100	100

absolutist level in at least some domains. Some developmental trend in the direction of declining absolutism appears between fifth grade and adulthood, although not a pronounced one. Consistent with qualitative patterns in Table 3, it is in the realm of truth judgments, particularly of the physical world, and also in the domain of values that individuals are most likely to remain at an absolutist level.

The percentages of participants of each group who were classified as at a predominantly evaluativist level appear in the lower portion of Table 4. These percentages, it is seen, are at a low among fifth graders and increase modestly up to the college level, where they are the highest, except for the expert group. Differences among the adult groups, except for the expert group, are slight. Across domains, mature adults, it is seen, are more likely than young college adults to remain multiplists in the values domain, as well as in the aesthetic domain (although some community college adults, note from the top portion of Table 4, remain at the absolutist level). Also notable in cross-domain comparisons, is the fact that, counter to our expectation, some individuals in all groups show the evaluativist pattern in the domain of personal taste. It is further worthy of note that in no group, with the exception of the experts, does the frequency of an evaluativist pattern in the aesthetic domain significantly exceed its frequency in the domain of personal taste. We address both of these findings in the discussion of results.

Differences across participant groups, as observed in Table 4, are modest. Since no specific predictions were made across the adult groups, we focused statistical analysis on several planned comparisons, first comparing all of the

adult groups combined (except experts) to the younger participants (fifth, eighth, and twelfth graders). These comparisons were made in separate analyses for the two major transitions, reflected in the upper and lower portions of Table 4. (In one analysis, the dependent variable was the number of nonabsolutist responses, reflecting the first transition; in the other it was the number of evaluativist responses, reflecting the second transition.) This comparison of all adults to all younger participants was significant with respect to the first transition, ($F(1,122) = 4.431$, $P = .037$), but not the second. Comparisons between individual younger groups and the undergraduates (who show the highest frequencies of evaluativist responses) showed significant differences between fifth graders and undergraduates and between twelfth graders and undergraduates and a marginally significant difference between eighth graders and undergraduates with respect to the first transition (fifth grade: $F(1,38) = 9.564$, $P = .004$; eighth grade: $F(1,43) = 3.256$, $P = .078$; twelfth grade: $F(1,39) = 6.320$, $P = .016$). With respect to the second transition, only the difference between the fifth graders and undergraduates reached statistical significance ($F(1,38) = 4.461$, $P = .041$). Statistical analyses by gender revealed no differences.

5. Study 2

We conducted a second study to shed light on the question posed earlier as to why so few transitional patterns between the absolutist and multiplist levels appear. Does this transition, as Chandler et al. (1990) suggest, occur very quickly, such that we are unlikely to capture many individuals in the midst of it? Or would a younger sample contain a higher proportion of individuals in the midst of this transition?

A problem in pursuing this question is that we were not confident that our instrument could be used successfully with children younger than the fifth graders who participated in Study 1. The questions are similar to one another, and require a careful reading. We therefore chose a group of second and third graders to whom we administered the instrument in a one-on-one verbal interview, with frequent comprehension checks and rest breaks. Although we have less confidence in their scores than we do in those of older participants, the results did allow us to tentatively choose between the two hypotheses contrasted above.

5.1. Method

Participants were 21 second and third graders of both genders (aged seven and eight) attending an after-school program in a private school. Parents were contacted and permission obtained for their child's participation. Each child was interviewed individually in a room away from the classroom by

one of the authors or another adult, both of whom were familiar to the children. As noted above, the interviewer proceeded slowly and carefully, pausing to assess comprehension frequently, and taking rest breaks as often as the child wished. The interview consisted of the set of questions shown in Table 2, administered in random order. All participants completed the task without difficulty.

5.2. Results and discussion

Of interest to us were children who showed a transitional pattern between the absolutist and multiplist levels. Only 8 of the 21 children interviewed fell into this category. (The others either remained solidly at the absolutist level, had already consolidated the transition to the multiplist level, or, in a few cases, had begun to show some evaluativist thought.) These findings support the hypothesis that the transition to multiplism advances rapidly once it has begun (although we have not ruled out the possibility that the transition would appear in a more extended form had we sampled even younger children).

Among these eight children, it is of interest to examine the transitional patterns observed and relate them to the few such patterns observed in Table 4. Most of the children — five of the eight — showed at least half of their thinking at the multiplist level (i.e., they scored at the multiplist level in two or more of the four domains that appear in Table 3). Of these five, two show the MAMM pattern that is frequent in Table 3, i.e., values remain at the absolutist level while the thinking is otherwise multiplist. Of the other three children, two remain absolutist only in the physical truth domain, and one in both physical and social truth domains. These patterns, then, support our earlier conclusion that values and physical truth are the domains in which an individual who has largely made the transition to multiplism is most likely to show a lingering absolutism.

The patterns of only three children reflected an initial transition to multiplism in only one domain, thus supporting the hypothesis of Chandler et al. (1990) that the transition to multiplism advances rapidly once it has begun. Of the three children in question, two showed the advance in the aesthetic domain (the pattern appearing in Table 3) and one in the physical truth domain.

Finally, as expected, personal taste (not shown in Table 3) is a domain that poses negligible difficulty with respect to the transition to multiplism, even among children of this young age. All but two of the 21 children had achieved this transition, recognizing that people can legitimately have different personal tastes.

6. General discussion

A major goal of the present work has been to place the study of epistemological understanding in a broader framework, one that connects it

to other cognitive attainments both vertically and horizontally. Vertically, we have attempted to trace how developments in epistemological understanding follow from very early attainments in the representation of knowing processes that have been studied under the rubric of "theory of mind." Horizontally, we have examined epistemological understanding in a broad context of judgment domains, establishing that epistemological beliefs regarding judgments of an aesthetic or value nature progress in a predictable manner that is related to, though distinct from, the progression of epistemological beliefs regarding judgments of truth. We believe this broader perspective enhances understanding of what develops in this domain and what the significance of this development is.

An orderly progression in levels of epistemological understanding can be observed, although it is one that varies across domains. The largest number of participants show a "pure" pattern of the same epistemological level across judgments domains, with this level most often being the multiplist level. The pure multiplist pattern was shown by 29% of the total sample (37 of 129 participants), which attests to the strength of this form of thought among adolescents and adults in our culture. The presence of patterns that span all three levels attests to the fact that this developmental evolution can often be protracted, with an individual advancing to the evaluativist level in one or more domains while remaining at an absolutist level in others. The sequence of attainment across domains was largely reversed for the two transitions, as predicted, with the transition to the multiplist level most likely to appear first in personal taste and aesthetic judgment domains and last in the truth domains. Transition to the evaluativist level, in contrast, was most likely to appear first in truth domains. For a number of individuals, however, both transitions proved most difficult in the values domain, a finding we had not predicted.

Examination of participant groups varying in age, education, and experience revealed both similarities and differences. Adults of all backgrounds are highly likely to make the transition from absolutism to the multiplist acceptance that knowledge is uncertain and divergent claims legitimate. The more informative, and troubling, finding is that no more than half of adults of any background and in any judgment domain make the subsequent transition to the evaluativist position. Adults (of any background) are least likely to accept the evaluativist view that there exist criteria for discriminating among judgments in the aesthetic domain. Indeed, there is no overall distinction in this respect between the domains of aesthetic judgment and personal taste — judgments of the superiority of one work of art over another are deemed no more valid than judgments that one season of the year is preferable to another. Although willingness to make such discriminations — to invoke criteria that render one judgment as having greater merit than another — increases as one moves to value and truth judgments, in any of the domains half or more of the adult population, across a range of educational and experiential backgrounds, continue to believe that one cannot

make discriminations among different claims — every claim has legitimacy equal to any other.[1]

There appears not to be any progression toward the evaluativist level of understanding with the increase in age and experience represented in the comparison between undergraduate and mature adult groups. Undergraduates show the highest proportion of evaluativist thought of all groups except the experts. Maturity and life experience, particularly educational experience, are often mentioned as the most likely contributors to the development of epistemological understanding. To the extent, as our data suggest, that increasing age and education are not sufficient to effect the transition to an evaluativist level of epistemological understanding, other experiential factors need to be considered as possibly implicated in this transition (or, more precisely, in its failure to occur).

One factor we would point to as salient is the intellectual climate and values that prevail in Western culture. At the heart of the evaluativist epistemological position is the view that reasoned argument is worthwhile and the most productive path to knowledge. Competing perhaps with this set of values in modern society are the values of social tolerance and acceptance — reflected in the "live and let live" and "to each his own" adages. There is much in modern society to suggest that the latter set of values overpower the former, with the result being an inhibition of intellectual development beyond the multiplist level. Choice of political candidates, to cite just one example, tends to be treated as a matter of personal taste and opinion, rather than comparison on the basis of positions supported by reasoned argument.

Mature adults, our data show, are even more likely than undergraduates to show the multiplist's "tolerance" of treating contrasting aesthetic judgments and value judgments as equally worthy. Their additional life experience has not fostered the view that discriminations are worth making or that there exists any basis for making them. As others' choices are respected in the realms of

[1] A note should be added, however, regarding our unanticipated finding that a few participants made judgments of the evaluativist type in the domain of personal taste. To get an idea of what might underlie these responses we returned to several of our expert participants to query them in more depth regarding their bases for claiming that one personal taste might be judged better than another. Regarding the food spiciness item, one of them made his view clear: "It is certainly true that different people can perceive the spiciness of a dish differently, but it is also true that spiciness can be measured scientifically, to a certain degree. Buyers of chile peppers have relatively objective ways to measure spiciness, although I'm not exactly sure what they are — some sort of spice-o-meter." He went on to say, "With regard to the time of day at which to conduct a marriage, it occurred to me that, although we presently don't really see any benefit to one or the other, we may, hypothetically, discover in the future that marriages from weddings conducted in the evening fail more often than those from weddings conducted in the morning, for example, leading to the conclusion that, whether we recognize it or not, there is a more salubrious time to marry." In other words, this philosopher tells us that the intellectual activities of inquiry and analysis offer the potential for judgments of discrimination, comparison, and evaluation in *any* domain that humans, as cognitive beings, might contemplate.

aesthetic preferences and values, similar to the respect accorded their preferences in personal tastes, so should their views about the nature of the physical and social world be accorded a similar respect. As noted earlier, it is a deceptively simple step, down a slippery slope, from the belief that everyone has a right to their opinion to the belief that all opinions are equally right. Tolerance of multiple positions, in other words, becomes confused with discriminability among them.

A possible objection to our conclusions might be made on methodological grounds. The assessment instrument used in this study, it could be claimed, is insufficiently sensitive to elicit the depth and complexity of individuals' epistemological understanding, and, as a result, this understanding has been underestimated. The work of other investigators, such as King and Kitchener (1994), which entail extended clinical interviews designed to probe numerous dimensions of epistemological understanding, does not support this criticism. They present no more optimistic picture of levels achieved by adult groups. Few individuals reach their higher levels. To specifically probe how performance on the instrument used here would relate to a more traditional interview instrument, Weinstock (unpublished) compared performance of community college students on the Livia problem (Kuhn, Pennington, & Leadbeater, 1983; Leadbeater & Kuhn, 1989; Weinstock, 1999) to their performance on the present instrument. Of the 33 students, 24 were assessed at the same overall level and 31 were assessed at the same or adjacent levels.

These results, we believe, reflect a strong enough correspondence to justify use of the short instrument. We do not of course claim that it captures the richness and range of epistemological thinking that a more extended interview reveals. A major practical advantage, as we noted, however, is that the assessment becomes short and simple enough to undertake across multiple domains. Also, we believe it is of theoretical significance that the major distinctions among levels of epistemological understanding that earlier research has identified are to a substantial degree (although not totally) captured by the two simple questions contained in our instrument.

A good deal might be said about the potential implications of limitations in epistemological understanding on individuals' intellectual functioning more broadly. As Baron (1993) notes, different domains of knowledge each have their respective epistemological foundations, and students' epistemological understandings within those domains need to be taken into consideration as a foundation for instruction. As we have seen in the present work, level of understanding may differ by domain, but there are also implications of limited epistemological understanding for intellectual functioning in general. As reflected in Table 1, an evaluativist level of epistemological understanding is necessary if there is to be any point — any perceived value — to the intellectual skills of inquiry, analysis, and argument that are widely accepted as the most important objectives of education (Kuhn, 1999a, Kuhn, in press). Moreover, it is worth noting, effects of level of epistemological understanding are not limited to

academic settings. Levels of epistemological understanding of jurors, for example, are predictive of the kinds of verdicts they choose and the reasoning that underlies them (Kuhn & Weinstock, in press; Weinstock, 1999). In short, the study of epistemological understanding and how it develops warrants a place in the mainstream of the study of cognitive development.

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