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Metacognitive Diversity Across Culture: An Introduction

Joëlle Proust and Martin Fortier

"Who was at the meeting? I'd like to know." "I don't understand this argument." "Was my prayer fervent enough?" These are ordinary examples of metacognitive evaluation. "Metacognition" refers to a set of processes that contextually control one's own on-going cognitive activity on the basis of such evaluations (e.g., perceiving, remembering, learning, problem solving or paying attention). Control is achieved by monitoring the feasibility of a cognitive operation, predicting or evaluating its likely success (Schwarz, this volume). Philosophical biology tells us that animals engineer their own epistemic environment in order to reduce their uncertainty in predator detection, and to increase predators' uncertainty in prey detection (Sterelny, 2003). Cross-cultural psychology and anthropology tell us that reduction of uncertainty is a universal human goal (Malinowski, 1948). Techniques, procedures, communicative processes and linguistic resources are present in all cultures whose aim is to express one's own uncertainty, report one's knowledge sources and adjust to others' informational needs (Gauvain, Munroe & Beebe, 2013, Nuckolls & Swanson, this volume, Papafragou and Ünal, this volume). In traditional societies, divinatory methods, astrology, and bird augury have been used to locate garden plots, start wars or make alliances. In contemporary Western societies, controlled experimental methods have been devised to build up valid factual knowledge. Proof has allowed mathematics and logic to develop. (Lloyd, 1979). Metacognitive processing is involved in all these practices.

The present book collects essays in linguistics, anthropology, philosophy, developmental, experimental, and social psychology, and the neurosciences, with the aim of integrating knowledge about the variability of metacognitive skills across cultures, and of identifying the potential factors accounting for such variability - such as childrearing practices, linguistic syntax and semantics, beliefs about the self and rituals. Many of the contributors participated in a conference that we organized in 2014 at the Ecole Normale Supérieure in Paris. In this introduction, the main reasons that, on our view, make this topic scientifically and culturally important and timely will be briefly presented, and the book contents summarized.

Why is diversity relevant to metacognition?

There is growing dissatisfaction, among anthropologists, psychologists, neuroscientists and philosophers of mind, with the massively ethnocentric view that has prevailed in the cognitive sciences. It has been gradually acknowledged that the study of the human mind can no longer be conducted on the basis of a non-representative sampling of participants as had been done since the beginning of experimental psychology. Participants in experimental paradigms have been defined as WEIRD if they fulfill the conditions of this acronym for Western, Educated, Industrialized, Rich and Democratic (Henrich, Heine & Norenzayan, 2010). As these authors have emphasized, they are also weird in the sense that they are "outliers" in the distribution of cognitive performance across the world. The low representativeness of this group has been documented in domains ranging from visual perception, fairness in economic decision-making, and cooperation, to reasoning and self-concepts. Let us note, in addition,

that diversity starts at our own door-step. We know virtually nothing of the cognitive dispositions of those Western individuals who have not received a formal education or have spent their lives in rural areas.

A second reason for focusing on metacognitive diversity has to do with a warning issued to experimental psychologists by Ulrich Neisser (Neisser, 1982): a lack of attention to the real settings in which cognitive and metacognitive processes operate may end up generating laboratory artifacts. How can a "real setting" be mapped into an experimental paradigm? There is no "standard real setting", because people across socio-economical statuses and cultural groups have different ways of organizing their lives and attend to different things. Division of labor, for example, seems to deeply impact reasoning and problem solving capacities. Hence collaboration of cognitive scientists with anthropologists, however difficult it may be to implement, is an unavoidable requirement for artifact avoidance.

More specific motivations for specifically exploring *metacognitive* diversity, however, occupy center stage in the contributions of the present book. These motivations have to do with three types of relation of metacognition to culture that up to now have failed to be properly investigated:

1. The first motivation for studying metacognitive diversity across culture is to emphasize the role of metacognition in the stabilization of representations and practices that together constitute a culture. Metacognition, as a cognitive skill that monitors and selects what to attend to and learn (or symmetrically, what to make salient and easier to learn), is essentially involved *in the selection, transmission, use, and expansion of information and knowledge relevant to a group* (for short: cultural transmission and cultural evolution). If achieving cultural transmission (at both ends of the chain) is a central function of human metacognition, then human metacognitive systems should be adapted to cultural transmission: this is a fascinating and intriguing, but barely explored, research question.
2. The second motivation has to do with the universality or relativity of epistemic values and norms. Two contrasting hypotheses, discussed in anthropology and in philosophy, can interestingly be re-assessed from a metacognitive viewpoint. On the first hypothesis, metacognition applies universal decision principles across the very different epistemic practices that are performed in different cultures. On this view, culture cannot regulate its own regulative decisions. It rather develops as a function of general informational parameters that are reflected in the biology of brain functions. On an alternative hypothesis, culture is taken to regulate its own regulations, making epistemic evaluations incommensurable across culture. The present book aims to provide innovative ways of adjudicating this venerable controversy.
3. The third motivation is the reciprocal discovery by metacognitive scientists and philosophers that studying metacognitive diversity can help us understand and reconsider key features of metacognition, such as the types of processing on which it depends (exclusively concept-based, or including affects), its articulation with social or moral norms and religious goals, and its extension to new kinds of epistemic practices. In order to present these three motivations in more detail, and orient the reader to the relevant contributions throughout the book for each of them, we first need to make explicit a working definition of culture.

Culture: a tentative definition

There is a wealth of proposals for defining culture, which cannot be reviewed here (for a review, see Kroeber & Clyde, 1952, Triandis, 2007). For present purposes, we will take culture to refer to a complex set of skills and representations -- norms, embodied practices, attitudes -- regarding social organization as well as the exploitation of natural or human resources and artefact production. Cultures, so understood, can be seen as a network of predictive patterns extending from subpersonal to supra-personal processes (Frith, 2007, Roepstorff, Niewöhner & Beck, 2010). Cultural knowledge being shared – and known to be shared – by a group of people (Reber & Norenzayan, this volume), it becomes relevant to the individuals' affiliation to a group and to their self-concept (on diversity in self-concept, see Yan & Oyserman, this volume).

Among the factors that are culturally transmitted, some are "objective", such as artefacts, institutions, social categories and roles, while others, such as religious beliefs, stereotypes, self-representations and moral norms, are "subjective", i.e. entertained by individuals (D'Andrade, 2001; Kitayama, 2002). Cognitive anthropology offers a naturalistic explanation of the causal relations between objective and subjective cultural items: both objective and subjective items are cognitive representations intended to guide or implement collective action through what they represent. Representations are social to the extent that they involve several cognitive agents engaged in collective practices in a shared environment (Sperber, 2001). This view is quite compatible with anthropological evidence showing that representations are significantly constrained by ecocultural factors (Talhelm et al., 2014; Uskul, Kitayama & Nisbett, 2008). However much societies may differ in their represented goals, in the social norms recognized, and in the self-representations that are made available for motivating and justifying individual behavior, they develop through similar cognitive processes and core motivations, and follow similar principles, such as minimizing cognitive effort and maximizing stability. Metacognition, then, is developed in each of these forms of life. We need to understand how culture might impact it.

Culture and cognitive abilities: influence versus shaping

Heated debates among specialists have argued for different roles for biological constraints and transmitted beliefs and practices in the evolution of cognition and culture. These controversies have focused on the relative importance of innate sensitivity and of transmission in the dynamics of culture. At one end of the continuum, transmission of practical knowledge and norms is taken to be the basic causal mechanism of acculturation. From this viewpoint, cultural diversity depends on the diverse goals and learning methods, patterns of action, institutions and linguistic skills that people have used and transmitted to adjust to their environmental resources (Rogoff, 2003). At the other end of the spectrum, cultures are seen as the manifestation of one and the same set of principles of innate mental architecture when confronted with different environments (Tooby and Cosmides, 1992). The observed differences in attitudes can, then, not just be learned, but also merely "evoked" by innate predispositions to respond to ecological variations. A majority of authors allow cultural stability to result from the dual influence of innate biases and universal learning principles (Boyd, Richerson & Henrich, 2011). The present book reflects these various views in their approaches to metacognitive diversity.

A distinction that sidesteps a specific theory of cultural evolution can help characterize in theory-neutral terms the relations between cultural settings and epistemic practices and their metacognitive regulations. A cognitive or metacognitive ability is (by definition) *influenced* by practices and beliefs if it is both universal and diversely elaborated as a function

of cultural representations. For example, the ability to process food is both universal and highly diversified. In contrast, one might define a cognitive or metacognitive ability as *shaped* by representations and practices if this ability would not have existed in the absence of dedicated training or a context of exercise and associated representations. For example, one cannot be a tennis player in the absence of any exposure to tennis rules. Being a doctor is a disposition to perform various specialized epistemic practices, which requires training and belief transmission. Being culturally shaped, it can be *diversely* shaped as a function of the training, local norms, and associated beliefs that are used to shape it. Cultural shaping explains why there is only a family resemblance between healthcare roles across cultures, from contemporary physicians to prehistoric surgeons, from Ayurvedic doctors to Amazonian shamans. Note, however, that social construction through shaping does not mean that any practice can be shaped and stabilized in a culture: a given healthcare function, for example, is controlled and monitored for its biological success as well as its social effects, and hence ultimately stabilized or not.

How does this distinction apply to metacognitive diversity? Can epistemic self-regulation be merely oriented and influenced, or can it even be shaped by culture? Whenever epistemic self-regulation is tightly associated with basic psychological functions, it is susceptible to influence, but not to social construction: it would be present even in the absence of any form of training. For example, people routinely evaluate their ability to discriminate objects, shapes and colors, or evaluate their ability to remember names. Explanations for perceptual or memory failures, however, vary with local views about the mind, about supernatural influence or about witchcraft. Similarly, learning is a universal cognitive ability. Even so, different background beliefs, norms, and educational goals can deeply influence not only the existence, but also the organization and implicit purpose of academic learning. The resulting misalignment in metacognitive evaluation of learning between teachers and students of theirs with different background has been shown to impair students' self-regulation and academic performance (Kühnen & Van Egmond, this volume). We will see below that misalignment in people's metacognition usually occurs when epistemic and social norms are simultaneously used to regulate a practice.

Can metacognitive evaluation be not just influenced, but shaped by cultures? To address this question, we need to introduce some definitions.

Universality versus constructivism about epistemic norms

Epistemic norms are the informational dimensions of the cognitive activity that is being monitored. They implicitly structure our metacognitive feelings and beliefs. A text may strike people as clear or obscure, coherent or incoherent, interesting or irrelevant, easy or hard to remember, and beautifully or badly written. An interesting research question is how epistemic norms are applied across culture, how they are conceptualized and how potential conflicts between them are adjudicated.

Social constructivism holds that epistemic norms are themselves shaped by the epistemic practices that prevail in a given group of people. As a consequence, norms of truth, coherence, or plausibility can vary across cultures; in other words, the basic instruments of epistemic evaluation are culture-specific and incommensurable across cultures (Holbraad, 2008). On an alternative view, what varies is the type of norm that is commonly used in a given context, rather than the content of a norm. People from all cultures believe what looks true to them, prefer to copy what is easy to copy, attribute knowledge to others and to themselves in similar circumstances, and so on (Bloch, 2008, Stich, this volume). They might, however,

adjust their beliefs to specific contexts, believing that the soul is immortal when burying their loved ones, and disbelieving it in a health context, as do the Vezos from Madagascar (Astuti & Harris, 2008; see other examples in Legare, this volume). On the latter view, the capacity to form true beliefs is not shaped. What is shaped is the type of epistemic practice assigning relevance to specific aspects in a given context.

The constraints that govern an epistemic practice, however, go beyond the epistemic. Diviners, as well as today's climate skeptics may deliberately offer predictions for their social, rather than their epistemic effects (Sperber, 2001). Even bona fide epistemic decision-making, when collective, easily falls prey to social norms, such as equality or gender biases. When a seemingly innocuous social norm of equal contribution to decision is substituted for a norm of collective accuracy, however, collective reliability vanishes: group performance is inferior to the performance of the best informed member(s) (Bahrami, this volume).

How cultural diversity makes new types of metacognition manifest

Finally, studying metacognitive diversity might have the additional value of shedding light on the structure of metacognition. At present, there is a broad consensus that it relies on two types of processing (Koriat & Levy-Sadot, 1999). In *experience-based* metacognitive evaluation, people rely on their noetic feelings in order to evaluate their own performance in a cognitive first-order task. For example, people can feel that they know or do not know a given proper name, even though they currently fail to retrieve it. In *concept-based* metacognitive evaluation, people rely on concepts and theories (about learning and remembering) to assess their own competence in a task. For example, they may judge that they can respond correctly to a question because it belongs to their own area of expertise.

Three kinds of evidence have been claimed to substantiate this contrast. First, some nonhumans, such as monkeys and rodents, are able to control and monitor their own cognitive activity just as humans do, in tasks involving memory of former presentations, or perceptual discriminations of displays (Call, 2010; Couchman et al., 2012; Kornell et al., 2007). These animals, however, do not possess the associated mental concepts. Second, twenty-month old infants have been demonstrated to ask for help – and hence, to reliably communicate their uncertainty to others – only when it is objectively needed (Goupil et al., 2016). It is only around four years and a half that children are able to use concepts such as "knowledge" or "merely guessing" (Gopnik & Astington, 1988; Sodian, Thoermer & Dietrich, 2006). Third, human adults tend to make more accurate predictions about their ability to recall study items when having engaged themselves in a learning task than when merely theorizing about what others should best remember (Koriat & Ackerman, 2010).

If experience-based metacognition is part of the human cognitive endowment, then experienced-based (also called "procedural") metacognition, should be found in all cultures, in one form or another. For example, feelings of familiarity, feelings of knowing, feelings of being right should be used irrespective of variability in epistemic and social practices. *Concept-based* metacognitive evaluation, however, might differ across cultures, at least on the plausible assumption that theories about the nature of knowledge and cognate concepts vary across cultures. The present book should help social scientists and cognitive scientists to extend and refine these two assumptions.

Experience-based metacognition, assuming that it is a core human ability, can nevertheless be variously influenced by cultural patterns, beliefs and practices. Take, for example, the tip of the tongue phenomenon. Speakers failing to retrieve a word from memory

may experience having the word on the tip of the tongue if imminent retrieval is likely. In the same situation, non-speaking signers report experiencing a tip of the finger experience. Or consider familiarity: the sense of familiarity is universal. Familiarity with faces, landscapes, celebrations, rituals, however, can vary with culture. As claimed by several authors in the book, a metacognitive experience of fluency comes with frequent exposure; it underlies evaluations of truth and of beauty (see Schwarz, this volume). Furthermore, a shared experience of fluency within a group, generated by common exposure to objective and subjective features of a culture (objects, institutions, and shared beliefs) might underlie social cohesiveness as a subjective sense of belonging (see Reber and Norenzayan, this volume).

Some of the anthropological chapters in this book offer evidence that metacognition can be shaped not only through culture-specific epistemic practices (such as divination), but through experiential designs intended to generate specific types of perception and their associated metacognitive monitoring. For example, religious rituals often include sequences of attentional blinding and sensory deprivation meant to control what the participants will remember of the events in question, and how they will interpret them, i.e. form beliefs related to the experience (see Reber & Norenzayan, this volume; Schjödtt & Jensen, this volume). This also seems to be the case for the metacognitive interpretation and regulation of drug-induced visual hallucinations, schizophrenic voices, shamanic dreams, and trance states associated with religious practices and attitudes about God or spirits (Fortier, this volume; Luhrmann 2012, this volume). A metacognitive "sense of reality" associated with these various states has been claimed to lead the agents to experience "as real" what they hallucinate or dream about. Individual memory processes related to specific events can also be shaped. Finally, metacognitive shaping is illustrated by religious or spiritual exercises, designed to develop specific moral or spiritual awareness in individuals by appropriate training, from Confucius' moral training for self-cultivation to Ignatius de Loyola's Spiritual Exercises (Luhrmann, this volume; Reber and Slingerland, 2011). In such cases, metacognitive beliefs (along with background beliefs about supernatural entities, important values, norms or desirable mental states) play a role in facilitating or even engineering new forms of metacognitive experience such as the feeling of being under God's guidance.

Composition of the book.

The main topics of the contributions have been organized in six sections.

Introducing metacognition. The first three chapters are intended to explain how (by which processes) and why (because of what kind of functional organization) the individual and collective types of metacognition that monitor and control decision-making both impact culture and are impacted by it.

Social psychologist *Norbert Schwarz* examines how metacognitive experiences combine with background beliefs and expectations to generate specific judgments and decisions. Thinking is associated with changing affective experience, generated by the thinking activity itself. Ease of processing (fluency) is experienced as pleasant, difficulty (disfluency) as unpleasant. He shows, moreover, that the interpretation of metacognitive feelings is highly malleable, depending as it does on the lay theory of mental processes that the individual is applying. Such lay theories may consist merely in the conception of the task at hand in one's own culture. People may attribute difficulty or fluency to factors that are irrelevant to their thinking processes; in this case, they fall prey to epistemic illusions and unreliable predictions. Schwarz offers many illustrations of the impact of feelings on judgment, in a variety of domains ranging from perception of beauty, assessment of consensus or supportive evidence,

perceived truth or internal coherence, to trustworthiness of a given source. An implication for cross-cultural variability deserves to be emphasized: metacognitive feelings should have different implications and guide different decisions when they are associated with different views about the mind, and about how mind and context can influence each other. Schwarz's analysis of the interaction between experience and concepts in epistemic evaluation should prove extremely fruitful to anthropologists investigating variations in assignments of truth, beauty, etc. across culture.

A central question in cultural studies is how to explain the social cohesiveness that is manifested in the tendency to accept collective goals, to share norms and world views, and most of all to develop a sense of we-ness and belonging to a group. A major theoretical challenge, however, consists in offering a unifying framework for a phenomenon that is both dynamic and highly multidimensional, and to explain the complementary role in social cohesion of shared objective cultural elements (objects, institutions, etc.) and subjective representations. Social psychologists *Rolf Reber* and *Ara Norenzayan* present a fascinating new theory explaining social cohesiveness as a social effect of the individual subjective ease – the fluency – with which a mental operation is performed. What they call "shared fluency" is a social rather than a merely individual phenomenon, however, because it is instrumental in behavioural coordination, which increases mutual liking, which in turn increases social interaction. Shared environments and objects, in this process, generate increased shared object fluency and shared liking. They convincingly apply their hypothesis to different anthropological areas, such as religious rituals, Confucian training on virtue-based ethics, and culturally shared tastes. In response to the objection that their theory fails to explain changes in tastes and other forms of shared fluency, they show how new goals, motivations and beliefs, framed as innovative and creative, might quickly spread and result in modified fluency thresholds.

Psychologist and neuroscientist *Bahador Bahrami* focuses in Chapter 3 on a different aspect of the interaction between individual-level metacognitive experience and group-level effects. Are two heads better than one – in matters such as perceptual discrimination? Using a standard psychophysical task, he proposed to participants to work in dyads to perform a perceptual decision task (what is the stimulus, in a display of six, that perceptually differs from the five others?). Participants first had to make their own decision based on what they saw on a computer screen. Subsequently, they had to communicate about their choice and, if in disagreement, to come up with a joint decision. Dyads with equal individual sensitivity benefited from interacting, i.e. came up with more accurate decisions. When dyads had very different sensitivities, however, they were less accurate than their best member. How can this be explained? Dyads seem to rely on an implicit heuristic rule that every member is as good as the other. This equality bias simplifies the task and makes social coordination much more pleasant. It is a sensible principle when the probability of a sensitivity gap remains small. When the gap is larger (above 12%), however, a decision framework of social influence (starting directly with joint discussion and decision-making) allows the dyad's sensitivity to perceptual information to be enhanced. New metacognitive information is collected in this process. A balanced combination of equality bias and social influence, then, should maximize reliability in collective decision-making.

How does metacognition develop? Cross-cultural studies – In order to study metacognitive diversity, a good place to start from is an assessment of the variability in the development of metacognitive capacities and mindreading across cultures. If, as postulated

above, experience and concept acquisition both contribute to shaping metacognition across cultures, one should expect developmental differences both in how the mind is represented (analytic metacognition and mindreading), and in how metacognitive experiences are fostered and boosted from infancy. As will appear in the three chapters of this section, most developmental studies assume that the ability to predict others' behaviors based on mental state attributions is universal (Avis & Harris, 1991, Wassman & Funke, 2013). Views differ, however, on how to construe mindreading, and on the significance of the observed cross-cultural variations in the dynamics of its development. Anthropological observations and theorizing, on the one hand, and cross-cultural psychological evidence, on the other hand, when taken together, draw a fascinating multidimensional model of what is often represented as a single decoupling ability. A new question that emerges from these studies concerns the interplay of early metacognitive feelings and the developing complex of predictive and justificatory abilities called "mindreading".

In Chapter 4, developmental psychologist *Paul Harris* contrasts the developmental pattern of two types of mental states. In mental states that conflict with reality, children are not better at reporting their own than others' mental states, which suggests that they do not have privileged access to what they falsely believe, or what their emotion was before they were informed of an emotional event in comparison to what others may have misbelieved or felt. When having to report about reality-based mental states such as desiring or knowing, however, children more readily report their own mental states than those of others, because they have privileged access to them. Comparing the utterances of three toddlers over several months (an European-American child of working class background, an African-American middle-class child, and a Han-Chinese middle-class child), Harris reports that a robust asymmetry emerged in children's spontaneous utterances. Children are more prone to deny knowledge by self rather than by others ("I don't know that", vs "you don't know that") and to ask a question about another's knowledge than about their own ("do you know that", vs "do I know that?"). Eight more children were found to present the same asymmetry. How can this be explained? Supposing that children automatically assume that others are better informed than they are, is inconsistent with the well-documented relevance of their declarative pointing behavior. Alternatively, children might more readily use their feelings of uncertainty when assessing what they know, Children's understanding of reality-based mental states, then, might develop on the basis of an early metacognitive sensitivity.

In chapter 5, developmental psychologists *Sunae Kim* and *Ameneh Shahaieian* and philosopher Joëlle Proust focus on the variability that has been documented, in developmental psychology, of the temporal lag observed, across cultures, in children's ability to solve false belief tasks. On the basis of anthropological evidence, including the opacity doctrine that inspires much of the social cognition and daily practices in the Pacific Islands, they suggest that false belief tasks may be inadequate mindreading tests in non-Western contexts. Alternative practices and values, such as the willingness/refusal to express one's own mental states, the degree of autonomous agency allocated to young children, and the style of communication used in childrearing might in part explain the timing differences in the development of mindreading. They propose that developmental metacognitive studies are confronted with a similar methodological issue. The cultural practices that regulate patterns of attention, learning style, and communicational pragmatics influence the kinds of epistemic decisions that need to be monitored and the process of attribution of knowledge to self and others in young children. On the basis of experiments conducted with German, Japanese and

Yucatec Mayan children, they present evidence for cross-cultural diversity in the development of implicit and explicit assessments of knowledge. This chapter suggests that any investigation of the reciprocal relations between experience-based and concept-based metacognition should include a broader set of culture-specific practices, religious rituals and family hierarchies that happen to be prevalent, and hence, fluent, independently of the concepts culturally available.

Executive function includes the processes that monitor and control individuals' thoughts and actions. For example, when planning to do something, we have to monitor the compatibility of our subgoals with the overall end, as well as the reliability of the predictive information that is needed. Executive function allows agents to act in accord with their evaluations of what it is best to do, and with their metacognitive feelings. In chapter 6, cross-cultural developmental psychologist *Athanasios Chasiotis* proposes that inhibitory control – a basic executive capacity, allowing agents to remain focussed on what is important to them, and to ignore irrelevant stimuli – is crucially involved in false belief tasks: impaired inhibitory control impairs mindreading, while impaired mindreading does not impair inhibitory control. Chasiotis further distinguishes, in inhibitory control, basic, implicit, automatic operations (called sensorimotor inhibition) from conscious, explicit ones (called volitional inhibition). Based on prior work, he suggests that the mindreading-relevant part of inhibitory control involves sensorimotor inhibition, a prerequisite both of conflict inhibition and volitional inhibition. A cross-cultural study involving preschoolers from Germany, Costa-Rica and Cameroon, suggests that the timing differences documented in false belief tasks might be related to the executive consequences of different parenting goals such as impulse control and exposure to interaction with adult conversation. A further study with German and Cameroonian pre-schoolers proposes that culturally encouraged Individualism in affiliation, achievement and power are likely to enhance mindreading. Chasiotis concludes that experience-based metacognition may have an acculturating role both through sensorimotor inhibition and through the attentional patterns associated with socially preferred implicit motivations.

Metacognition in communication - When studying the relations between metacognition and communication, it is appropriate to focus both on the role of procedural metacognition in verbal and non-verbal communication, and on the reciprocal influence of verbal communication on metacognitive analytic ability. Relevant to the first question is the observation that the four Gricean conversational maxims, supposed to flesh out the principle of cooperation as a basis of all human communication crucially involve metacognitive processes. Making one's contribution "as informative as needed by the recipient (not more)" (the maxim of quantity) supposes monitoring the observed increment of information produced in an utterance (or a gesture), compared to an expected standard (Goldsmith & Koriat, 2008). "Be truthful!" (the maxim of quality) requires assessing one's own ability to offer correct information. When a speaker needs to persuade others of the truth of a false utterance, the coherence and plausibility of this utterance need to be carefully monitored. "Be relevant" (the maxim of relation) requires monitoring of the ratio between informativeness and fluency for a given utterance or gesture. Finally, "be clear, brief, orderly" (the maxim of manner) amounts to maximizing (i.e., monitoring and controlling) the fluency of one's message. As observed by Eleanor Ochs-Keenan (1976), the maxim of quantity is not a basic norm in Malagasy and similar societies, where there is no regular expectation that speakers will satisfy the recipients' informational needs, both because information "is a rare

commodity" that confers prestige on the knower, and because people are afraid to commit themselves to particular claims, concerning past and future events. These variations in the standard of informativeness exemplify the pervasive, although possibly diversified, reliance on communication. Contributors to this section propose cross-cultural evidence and theorizing concerning how diversity in metacognition may influence, or be influenced by communication. The case of evidentials, (i.e. markers of information source) is a common target of their analyses.

In Chapter 7, psycholinguists *Ercenur Ünal* and *Anna Papafragou* investigate whether language influences our cognitive and metacognitive capacity to handle mental state representations. Having a theory of mind involves attending to information sources, which in turn involves a distinctive form of metacognitive monitoring and control (seeing versus inferring, vs being told). Linguistic markers encoding information source – perception, hearsay, inference – may be either mandatory (e.g., in Turkish, evidentiality is grammaticalized) or optional (e.g., in English). This contrast can be used to test whether language influences source metacognition: speakers, who constantly need to encode their information source, should be more sensitive to it than speakers with no such linguistic constraint. The authors report their developmental studies, demonstrating that children from both groups present similar source monitoring abilities, which suggests that the linguistic expression of evidentiality builds on non-linguistic awareness of informational source. Additional evidence consists in the asymmetry, (also discussed by Paul Harris, this volume), between assessing one's own information sources and reasoning about information sources for others. Adult speakers from both linguistic groups were also found not to differ in their source-monitoring performances. The authors finally discuss the hypothesis that mastery of syntactic complementation may contribute to the development of false belief understanding and explain deaf children's delay in solving the false belief task. They propose that complementation scaffolds children's representation of mental states, without forming a necessary condition. Adult studies further suggest that false belief reasoning is not affected by linguistic impairments.

In chapter 8, anthropologists *Janis Nuckolls* and *Tod Swanson* explore the relations between Quichua communication and metacognitive monitoring. 1) Animism endows all forms of life with a perspective and an ability to communicate. It explains the pervasiveness in Quichua language of ideophones — onomatopoeic representations of sounds —, and Quichua speakers' reluctance to produce general, perspectiveless claims. 2) Perspective is grammatically encoded in evidentials, which mark the informational source of a statement. In Quichua, evidentials are shown to have the function of contextualizing statements within a perspective, not of reporting an objective, verified fact. This feature is not motivated by negative politeness (i.e. the speaker's reluctance to impose his/her own perspective on the addressee), which is based on an individualized view of the self. It rather stems from a norm of perspectival communication associated with a relational view of the self. 3) Quichua includes a limited number of illocutionary verbs. Quichua speakers, however, in line with their sensitivity to multiple perspectives, make a wide use of reported speech to articulate others' thoughts, whether human or not. 4) How does Quichua express confidence? Various pragmatic devices point to speakers' "lack of discomfort" with subjective uncertainty. These include: self-directed questions, often explicitly presented as unanswerable, echo questioning used both to recognize the interlocutor's question as legitimate and to express one's lack of

knowledge, and uncertainty adverbs. Finally, certainty claims are proposed to be depend on a norm, "pathetic truth", related to Quichuas' empathic sensitivity to perspective.

In Chapter 9, anthropologist *Olivier Le Guen* explores the specific set of social and epistemic norms that, in Yucatec Mayan communication, govern information sharing practices and the associated kinds of epistemic decision-making. Based on his field work, Le Guen shows that a non-Gricean implicit maxim of quantity, "Be vague!", (i.e., minimize the informational content of your utterances!) underlies Mayan communication. Mayas are unwilling to provide precise information when referring to persons' names, supernatural entities, or dangerous animals. They prefer passive constructions, where the agent of an action does not need to be identified; transitive constructions, in contrast, are meant to imply responsibility. Speakers and addressees are masters in controlling any emotional information that their facial expressions might display. Their implicit maxim of quality "Withhold (accurate) information whenever it is safer to do so!" also contrasts with Grice's ("Be accurate!"). In Mayan conversation, the truth of an utterance is not automatically expected; assertions are only believed when confirmed by third parties. Children are both implicitly and explicitly made sensitive to others' deceptive tricks and manipulations. Speakers have a wide linguistic repertoire available to them to adjust to the various contextual demands on precision and accuracy: obligatory evidential markers and deictics communicate the informational source and novelty of a message, as well as the nature and distance of any perceptual access. Evidentials and quotatives can be used to report second-hand knowledge with varying commitments to accuracy. In conclusion, Le Guen explores the possible implications of Mayan epistemicity on Mayan children's acquisition of a theory of mind.

Metacognitive regulation and self-concept - Cultural psychologists have extensively studied the diversity of self-concepts across cultures. This diversity has been cashed out in several ways (e.g., Hofstede, 1980; Triandis, 1989). An influential theory contrasts the Asian *interdependent* view of the self with the Euro-American *independent* view of the self (Markus & Kitayama, 1991). These two self-concepts differ chiefly in terms of (1) style of action (*action as influence* vs. *action as adjustment*); (2) self-evaluation and relationships with others; and, (3) cognitive style (*analytic perception and reasoning* vs. *holistic perception and reasoning*) (for a review see: Kitayama, Duffy, & Uchida, 2007). Distinctions such as these are often blamed for being too dichotomic and essentialist (e.g., Astuti & Bloch, 2010; Roepstorff, 2011), too broad to account for the nuances and details reported by ethnographers, and to ignore internal diversity within cultural ensembles. In response to these objections, proponents of the interdependent vs. dependent model have explored how ecological and historical factors have contributed to differentially shape Asian cultures, fostering the interdependent self-concept in some Asian cultures and regions and the dependent self-concept in others (Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006; Talhelm et al., 2014). Finally, variability in self-concepts has been increasingly recognized to depend on situations and contexts (Markus & Hamedani, 2007; Oyserman & Lee, 2007). In addition to the independent vs. interdependent dimension including its three associated features (action, relatedness and cognitive style), an autonomy vs. heteronomy dimension has been proposed to constitute an additional, orthogonal dimension of variation, (Kagitcibasi, 2005; Keller, 2012).

How, then, does cultural variation in self-concepts impact metacognition? Central to metacognition is the capacity to evaluate oneself in various cognitive tasks ("Did I perform well or did I perform poorly?"). Psychologists have assumed the ubiquity of the self-serving bias, or "better than average effect", that leads people to over-estimate their actual

performance and competence (Maslow, 1943, Bahrami, this volume). While North Americans have been found to indulge in such self-enhancement, East Asians, on the other hand, tend to be more self-critical (for a meta-analysis, see Heine & Hamamura, 2007). Beyond these broad differences in critical orientation, the influence of situations on the interplay between self-concept and metacognition needs to be studied across culture both at the individual and at the group level.

In Chapter 10, social psychologists Veronica Yan and Daphna Oyserman propose a model of metacognitive decision in which such an interplay between culture, identity and metacognition is analysed from the viewpoint of situated social cognition. Their basic assumption is that motivation is identity-based. People's interpretations of situations and their action preferences depend on congruence with what "people like us/me" do. The prevalent sense of self and their metacognitive experience of fluency and congruence, however, closely depend on the current context of action. In contrast with other theorists of a culture-driven view of self (e.g. collectivist Asians), they consider that independence, interdependence and honor are main organizing frames of people's self-concepts irrespective of culture. They see the influence between metacognitive feelings and identity as bidirectional: one's contextual identity determines how metacognitive experiences of fluency will be interpreted; conversely, the ongoing metacognitive experience in a task will make one feel that a task or behavior is not "for me" or "for us", and even dynamically affect one's self-concept. As a result of such reciprocal causal influence, difficulty in schoolwork can lead to greater effort — if the task is deemed important for one's identity — or to disengagement — if the task is deemed unattainable, which may occasion a changed view of who one is. Experiencing cultural disfluency, then, undermines one's certainty about who one is, which in turn affects one's confidence in predicting and acting on the world.

In Chapter 11, psychologists Ulrich Kühnen and Marieke van Egmond examine the influence of diversity in beliefs about formal learning on both formal learning and students' metacognition of learning. A naïve theory of learning is that you acquire your learning skills gradually and without a specific instruction. The authors show that the way you learn is rather shaped by social interaction. Western traditions of education are centered on epistemic properties, such as knowledge, understanding, critical thinking. Eastern traditions, in contrast, focus on in-group harmony, social and moral personal development. These mind vs virtue orientations are consistent with different prevalent conceptions of the self, along the independence-interdependence dimension. With this contrast in mind, the authors found that four questions determine learning orientation: the purpose of learning, its underlying processes and associated emotions and the characteristics of the ideal learner. Based on these major differences, they built up a mind-virtue scale designed to assess variability in learning beliefs. This allowed them to show that, irrespective of their own field, German teachers are strongly mind-oriented. Western European students had a positive learning experience, based on the documented shared fluency of learning orientation with their teachers. In contrast, their Eastern European and non-Western students experience rather a disfluent, uneasy inconsistency in learning-orientation over their school years, had a harder time in behaving in ways positively valued by the faculty, resulting in underperformance and diminished satisfaction.

Cognitive anthropologist *Giovanni Bennardo* examines, in Chapter 12, the diversity in self-concept from the angle of culture-specific ways of representing the world. Drawing upon ethnographic and experimental data collected in Tonga, Bennardo shows that Tongan cognition revolves around the foundational model of a radial frame of reference. Relative

frames of reference designate frames centered on ego (e.g., being on my left). Absolute frames of reference designate frames centered on an other-than-ego point (e.g., being in the South). The radial frame of reference combines the two: an other-than-ego point is chosen within the field of ego (e.g., being around the person facing me). Not only is this model of radially pervasive in the way people conceive of spatial navigation, kinship, or the supernatural (*mana*). It also defines the Tongan conception of the self. Importantly, Bennardo shows that the radial self-concept shares many commonalities with the interdependent one; but whereas the latter stresses the importance of relatedness in general, the former focuses on the relation toward a single being.

Metacognition within religious practices. Considerable advances have been made in the understanding of the cognitive underpinnings of religion (De Cruz & Nichols, 2016; Pyysiäinen & Anttonen, 2002; Slone, 2006). Although mainly concerned with *cognitive* processes, these theories have obvious implications for *metacognition*. For instance, emphasis on the role of counterintuitive contents in religious beliefs has tended to ignore the metacognitive processes and the associated feelings of fluency, informativeness and relevance that single them out. Memorability of religious counterintuitive representations (Boyer & Ramble, 2001), however, might be better understood in the light of metamemory studies. Chapters of this section explore how metacognition is involved in many religious practices and experiences, thus paving the way for a much needed research program concerning metacognition in religion.

In Chapter 13, anthropologist *Tanya Luhrmann* investigates the metacognitive dimensions of prayer. Why do people pray? One proposal is that humans are evolutionarily wired to detect spirits; praying would be a way to relate to these spirits. Luhrmann argues that this account does not explain the pervasiveness and persistence of prayer. An alternative explanation is that prayer fosters emotional comfort through emotional management. Luhrmann shows that this function of prayer is mainly supported by metacognitive mechanisms. Prayer requires disciples to pay enhanced attention to their thoughts and thereby to cultivate (positive) thoughts and neglect (negative) ones. The success and the efficacy of prayer is further shown to rest upon two main factors: absorption and narrative structure. Absorption—the ability to pay acute attention to inner events—depends both on personality traits and training. Furthermore, the sophisticated narrative structure embodied in some prayers strengthens attention and helps one to feel more immersed. By combining these mental devices, prayer allows people to become detached from the world and to simulate vivid thoughts and scenes that improve their well-being. Although Luhrmann's examination of the metacognitive dimensions of prayer is based mainly on Christian prayer, she points out that these dimensions are also widespread among non-Christian cultures (as illustrated by the case of Navaho prayer).

Chapter 14, by neuroscientist *Uffe Schjødt* and anthropologist *Jeppe Jensen*, is mainly concerned with the role of metacognition in religious rituals. Two mechanisms—*depletion* and *deprivation*—are specifically examined. *Depletion* characterizes rituals in which executive prefrontal processes are momentarily de-activated by diversion of attention or by painful ordeal (notably in initiation rituals). As a result, the evaluation of one's experience is impaired. Schjødt and Jensen envisage that depletion of metacognitive abilities makes disciples more suggestible and allows religious officiants to enforce established interpretations of ritual experience. *Deprivation* involves the reduction of sensory information and the subsequent strengthening of prior models of the world. An obvious way to bring about deprivation is to perform rituals in dark and impoverished sensory environments. Decreased bottom-up

signaling tends to boost top-down expectations and can thereby trigger hallucinations and anomalous beliefs. Deprivation can also take more unexpected forms. The hypnotic effect evoked by charismatic religious leaders is one of these: worshippers rely less on external sensory information and more on the leader's teachings. Both depletion and deprivation favor conventional and culturally sanctioned schemas, fostering "supra-personal" forms of religious metacognition. The authors argue further that the unique ability that humans have to communicate metacognitive contents underpins the constitution of shared (supernatural) worlds. Metacognition and religion thus have complex relations. At the personal level, religious rituals impair and dampen metacognitive abilities in order to favor widespread shared priors. At the supra-personal level metacognition ensures the transmission and the adjustment of shared priors.

In Chapter 15, cognitive anthropologist Martin Fortier examines the role of metacognition in drug-induced hallucinations. Influential "monitoring models" of schizophrenic voices propose that both the content and the sense of reality of hallucinations can be explained by an impaired metacognitive process tagging sensory experiences as externally generated. Fortier objects that these models fail to acknowledge a possible dissociation between sensory experience and sense of reality. They wrongly assume, in addition, that the sense of reality is a homogenous phenomenon. In contrast to what is often claimed, the mechanisms involved in "monitoring models" of hallucination do not all qualify as genuinely metacognitive. An alternative model of the sense of reality and of hallucination is proposed. In support, two distinct kinds of hallucinatory experiences are examined: those induced by serotonergic hallucinogens (e.g., ayahuasca) and by anticholinergic ones (e.g., datura). It is argued that only the latter importantly tap into subpersonal metacognitive processes. Finally, Fortier examines how experiences induced by psychedelic substances become encultured and are diversely employed in Amazonian supernatural belief systems. Two topics—related to personal and supra-personal metacognition—are explored: how Amazonian shamanic traditions variously deem metacognitive feelings worthwhile and truth-conducive; and how hallucinogenic experiences enable people to modify the epistemic status of their supernatural representations—to wit, hallucinogenic experiences allow them to experientially verify representations that were previously only deferentially endorsed, thus further enhancing their credibility.

Do epistemic norms vary across cultures? - This section aims to address a controversial issue: does variation in metacognitive practices entail that not only sensitivity to epistemic norms, but even the norms themselves should also vary? Epistemic norms, as defined above, are the informational dimensions of the cognitive activity that is being monitored (Proust, 2013). On this definition, ease of processing, i.e. fluency, is a basic epistemic norm. It provides a way of selecting statements as a function of prior exposure, which tends to correlate with truth, a useful (but risky) heuristic when one has to make a prompt or intuitive decision (see Schwarz, Reber & Norenzayan, this volume). One can also monitor the accuracy of a memory, its exhaustive character, the informativeness of a statement, its consensuality, its coherence with what one already believes, its plausibility, its relevance. If the evaluative practices concerning one's perception, one's memory, or one's reasoning vary across cultures, or across contexts in a single culture, could some people – in certain contexts – be unable to sense when they are right or wrong? Or have multiple criteria for what counts as right or wrong, depending on the circumstances? There is no consensus on how to address these questions, as the three chapters of this section will make clear. A further definition may clarify the state

of the art for non-philosophers. *Epistemological realists* maintain that metacognitive evaluation is a universal competence that cannot vary in its normative aspects, because it responds to objective features of information. Indeed truth and coherence in mathematical demonstrations, for example, are recognized irrespective of culture. *Epistemological constructivists* (or *relativists*) deny that epistemic norms are as stable and invariant across cultures as they seem to be from a Western perspective. Epistemological realism is compatible with the view that cultural practices or contexts determine *what counts as* an accurate or informative piece of information, and *when* it is relevant to attend to a specific normative property. However it is incompatible with the view that evaluations are incommensurate across cultures.

Granting that intuitions are spontaneous judgments about given object or event properties, do intuitions about knowledge vary across cultures? This question, raised by philosopher *Stephen Stich* in chapter 16, bears on two closely related issues – the universality of epistemic norms, and the significance of having an "intuition-like" experience as a sign of a correct conceptual understanding. In philosophy, intuitions are assumed to be immediate evidence for correct conceptual analysis, i.e., for the truth of a claim, of a definition, or of a theory. The existence of cross-cultural variations in intuition should pose problems for philosophers, most of all for epistemologists. Do people intuitively know what knowledge is? In current epistemological theorizing, knowledge is defined as a belief that is true, justified (based on evidence), and fulfilling an additional, elusive condition concerning the contextual soundness of the justification, called the "Gettier condition" (e.g., "I know it's 12 noon if the clock shows 12 noon *and* it is not stuck on 12 noon all day long"). In a previous cross-cultural study, Stich and his colleagues had found variability in the assessments of knowledge of American undergraduates from three cultures based on simple "Gettier style" narratives. This challenged the use of intuitions as evidence in philosophy. It has failed to be replicated, however. A new study, performed with Edouard Machery, collected data from 23 countries, showing that each culture has an epistemic concept translated in English as "knows" that includes the Gettier condition– with minor variations, however. Several interpretative options, relevant to other cross-cultural findings, should help determine the epistemic status of intuitions, in philosophy and elsewhere.

Chapter 17, by anthropologist *Jonathan Mair*, examines the epistemic norms at play in the lay Buddhism of Inner Mongolia. Deference proves particularly central. Epistemic deference can take different forms. Mair compares the epistemic style promoted by a renowned local Buddhist master with that promoted by most masters and disciples. The former holds that in order to be understood, scriptures and teachings require a great amount of deference and faith. Nonetheless, he also insists that genuine understanding of the Buddhist teachings is virtually reachable by anyone—deference alone is not sufficient to access truth; self-reflection is critically required. This view contrasts with that of most people in the region according to which radical deference and intellectual humility are suitable for lay people. This radical deferential attitude leads disciples to refuse to read any book or to attempt to grasp any of the key ideas encountered in Buddhist texts. Understanding, it is assumed, is restricted to the most advanced masters and lamas. The epistemic life of most lay Buddhist practitioners is thus characterized by radical deference and self-effacement. In order to shed some comparative light on these ethnographic findings, Mair finally turns to the intriguing phenomenon of post-truth. This example provides an inverted mirror of the epistemic style encountered among the Buddhists of Inner Mongolia. Indeed, Mair argues,

post-truth seems to result from the combination of active questioning and skepticism on the one hand, with the collapse of epistemic authorities, on the other hand.

The diversity of epistemic norms sometimes results in the coexistence of distinct explanatory models. For example, the same event can simultaneously be explained using a norm of accuracy (in which the event of a tree seeing a tree falling mechanically) and a norm of consensus (people say that in such situation the collapse of a tree is caused by a spirit). Each norm is liable to generate its own explanatory model. Hence the existence of competing explanatory frameworks: intuitive vs. reflective (Cruz & Smedt, 2007; Shtulman, 2017); supernatural vs. natural (Legare, Evans, Rosengren, & Harris, 2012); religious vs. magical (Fortier & Kim, 2017); etc. The phenomenon of explanatory pluralism is thus tightly tied to the diversity of epistemic norms.

In Chapter 18, psychologists *Cristine Legare* and *Andrew Shtulman* address the question of coexistence, in individual minds, of religious and scientific explanations. The Secularization hypothesis that supernatural explanations will eventually be replaced by natural ones is demonstrated to be wrong. People from all cultures can endorse up to four alternative explanations of the same phenomena, such as death, illness and human origins. They may differ, however, in their metacognitive awareness of using incompatible accounts. Metacognitive diversity is reflected in three forms of reasoning that people may use to accommodate plurality in causal explanations. *Integrated reasoning* coordinates accounts within a larger causal structure, allowing levels and timescales (e.g. God and natural selection) to call for a distinctive account. *Synthetic reasoning* involves taking divergent explanatory models to be equally plausible and leaving their detailed arrangement open-ended. *Target-dependent reasoning* recruit natural or supernatural explanatory accounts for distinct aspects of an event or phenomenon. If reasoning about supernatural phenomena is a universal feature of human cognition, new research questions arise: why do people engage in one of the three forms of reasoning described – ignoring contradictions, vacillating between them, or integrating them? According to Legare, these three ways of dealing with explanatory coexistence are equally present in all cultures. By contrast, the kind of coexistence that one can encounter is culture-dependent: the tension between supernatural and scientific models is confined to cultures in which science has developed and has become prominent enough to influence lay people's thinking.

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