Chapter 10

Thinking across cultures: Implications for dual processes

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In *A History of God*, Karen Armstrong describes a division, made by fourth century Christians, between *kerygma* and *dogma*: 'religious truth … capable of being expressed and defined clearly and logically,' versus 'religious insights [that] had an inner resonance that could only be apprehended by each individual in his own time during … contemplation' (Armstrong, 1993, p.114). This early dual-process theory had its roots in Plato and Aristotle, who suggested a division between 'philosophy,' which could be 'expressed in terms of reason and thus capable of proof,' and knowledge contained in myths, 'which eluded scientific demonstration' (Armstrong, 1993, 113–14). This division—between what can be known and reasoned logically versus what can only be experienced and apprehended—continued to influence Western culture through the centuries, and arguably underlies our current dual-process theories of reasoning.

In psychology, the division between these two forms of understanding have been described in many different ways. The underlying theme of 'overtly reasoned' versus 'perceived, intuited' often ties these dual process theories together. In Western culture, the latter form of thinking has often been maligned (Dijksterhuis and Nordgren, 2006; Gladwell, 2005; Lieberman, 2000). Recently, cultural psychologists have suggested that although the distinction itself—between reasoned and intuited knowledge—may have precedents in the intellectual traditions of other cultures, the privileging of the former rather than the latter may be peculiar to Western cultures (e.g. Lloyd, 1996; Nakamura, 1960/1988; Nisbett, 2003). The Chinese philosophical tradition illustrates this difference of emphasis. Instead of an epistemology that was guided by abstract rules, 'the Chinese in esteeming what was immediately perceptible—especially visually perceptible—sought intuitive instantaneous understanding through direct perception' (Nakamura, 1960/1988, p.171). Taoism—the great Chinese philosophical school besides Confucianism—developed an epistemology that was particularly oriented towards concrete perception and direct experience (Fung, 1922; Nakamura, 1960/1988). Moreover, whereas the Greeks were concerned with definitions and devising rules for the purposes of classification, for many influential Taoist philosophers, such as Chuang Tzu, '… the problem of … how terms and attributes are to be delimited, leads one in precisely the wrong direction. Classifying or limiting knowledge fractures the greater knowledge' (Mote, 1971, p.102).

Drawing on a distinction between 'analytic' and 'holistic' thinking, cultural psychologists have argued that these two systems of thinking are unevenly distributed across cultures—the former is more prevalent in Western cultures, whereas the latter is more prevalent in East Asian cultures. While other conceptualizations of human thinking across cultures have also been made (e.g. Cole and Scribner, 1974; Medin and Atran, 2004; Witkin and Berry, 1975), the analytic-holistic distinction appears to be directly relevant to dual-process theories. But are the cultural psychologist's Holistic and Analytic the same thing as Systems I and II (Kahneman, 2003; Stanovich, 1999), or Associative and Analytic (Sloman, 1996), or Intuitive-Experiential and Analytical-Rational (Epstein et al, 1996), or any of the many similar divisions that have been made in the Western cognitive psychology literature? While acknowledging the similarities between their distinction and the dual process models (e.g. Nisbett et al., 2001; Norenzayan et al., 2007), most cross-cultural researchers have not explicitly dealt with the issue of how the analytic-holistic distinction maps on dual process models of reasoning, an issue which is the main topic of the present chapter.

In this paper, we will examine how analytic and holistic thinking have been defined by cultural psychologists, and briefly review the studies in this new tradition. We will suggest that holistic and analytic thinking are in many ways very similar to the dual-process theories that have been described by Western cognitive psychologists, and in fact the cross cultural evidence supports the plausibility of this distinction. However, the emphasis on holistic thinking that has occurred in East Asian societies may also have led to the development of a more sophisticated kind of non-analytic thinking than in the West. In particular, different cultural norms for thinking may have encouraged explicit, contextualized thinking in a way that is less common in the West, and in a way that is not fully captured by some aspects of popular dual-process theories. By attending to the forms of thinking that have been shown to be particularly East Asian, we may be led to a greater understanding of how humans can develop our fundamental cognitive abilities to better adapt to the particular demands of cultures.

Holistic versus analytic modes of thought: A brief overview

In the 1990s, Richard Nisbett and colleagues began to examine the idea that one's cultural background could influence not only the content of one's thoughts (beliefs), but also the very information processing strategies used to know the world (for extensive reviews, see Nisbett, 2003; Nisbett et al., 2001; Norenzayan et al., 2007), These studies showed that East Asians had a greater tendency to rely on context to make decisions, while, under identical task conditions, Westerners tended to de-contextualize, using feature-based and rule-based strategies (Nisbett et al., 2001). Further studies have extended this work in the directions of covariation detection (Ji et al., 2000), tendency to use abstract rules versus experience in categorization and deductive reasoning (Norenzayan et al., 2002), and tendency to use dispositional (i.e. information attached to a decontextualized individual) versus situational (i.e. contextual) information to explain behavior (Choi et al., 1999; Masuda and Kitayama, 2004; Miyamoto and Kitayama, 2002; Morris and Peng, 1994; Norenzayan et al., 2002). These cultural

differences do not emerge only in the conceptual domain, but also have been found in attention and perception. Eye tracking experiments indicate that Americans fixate more on focal objects than do Chinese and Japanese (Chua et al., 2005; Masuda et al., 2007; Masuda et al., in press). These and similar findings (Kitayama et al., 2003; Masuda and Nisbett, 2006) support the idea that cultural experiences affect what people actually perceive in a scene.

The evidence for cultural variation in cognition and perception is robust and reliable—these differences emerge from a variety of unrelated paradigms and methodologies, with a variety of samples, and many artefactual explanations have been ruled out (see Nisbett and Masuda, 2003; Nisbett et al., 2001; Norenzayan et al., 2007). A meta-analytic review of studies comparing East Asians (Chinese, Koreans, Japanese) and North Americans (excluding Asian North Americans) indicated that the overall effect size of the cultural difference is moderate to large, and this effect size is as strong for attentional and perceptual tasks as it is for tasks that involve language-based conceptual processes (Miyamoto et al., 2006, January). Not surprisingly, East Asians tested in East Asian countries diverged more strongly than East Asians tested in North America.

While initial studies did not specify the particular moderators of these cultural differences, cultural differences in individualism versus collectivism were theorized to be a partial cause. Subsequent work has supported these theories, showing that priming independent versus interdependent self-concepts (e.g. thinking of 'I' versus 'We' pronouns) causes participants to temporarily adopt analytic versus holistic thinking styles and skills (e.g. Cha, 2007; K. Kim and Markman, 2006; Kühnen and Oyserman, 2002). In addition to these general cultural effects, holistic and analytic thinking can also be transmitted through formal education in a specific society or philosophy, such as Oriental Medicine (Koo and Choi, 2005). Similar studies have shown that exposure to Western-style formal education in non-Western cultures increases the tendency to decontextualize deductive arguments (Cole and Scribner, 1974). These studies suggest that (1) the cultural differences are best conceptualized as differences in *habits of thought*, rather than differences in the actual availability of information processing strategies in the cognitive repertoire, and that (2) holistic and analytic ways of thinking can be differentially encouraged in their development and use by different cultural and situational constraints, and that these cultural differences can be seen both in habits of basic processing as well as culturally-elaborated epistemic beliefs and lay theories.

Definitions: Is holistic-analytic the same as System 1 and 2?

It is important to note that the primary focus of the holistic-analytic difference has been on differences in attending to *contextual*, relational / associative information, versus attending to *focal* objects, divided from the context. As we will see below, literature on dual-process thinking often focuses on these differences. However, the dual-process literature also concentrates on other elements of the definitions that are not usually attended to by cultural psychologists, such as contrasting effortful versus

effortless thinking, with the associative processes depending more on effortless heuristics (Evans, 2003, 2006; Verschueren et al., 2005). In a recent review, Evans (2008) defines four 'clusters' of characteristics that are commonly used to define System 1 and System 2 processes. The cultural definitions of analytic and holistic modes appear to closely parallel the 'functional characteristics' cluster, defined by contrasts such as associative versus rule-based, or contextualized versus abstract. But do the other clusters of common characteristics—such as unconscious versus conscious, or shared with animals versus uniquely human, or independent of versus linked to general intelligence—also reflect the holistic-analytic division? We would suggest not. In fact, cultural psychology studies may show that contextualized versus decontextualized thinking is functionally separable from the other clusters of System 1 and System 2 attributes.[1]

Similarities: Contextualizing versus decontextualizing, relational versus not

Describing System 1 as 'contextualized' and System 2 as 'decontextualized' is a common theme in definitions given by dual-systems theorists, as can be seen in summaries of the literature (e.g. Epstein, 1991; Evans, 2008; Kahneman, 2003; Sloman, 1996; Stanovich and West, 2000). Classic tests of System 1 versus System 2 often test whether or not participants will ignore 'irrelevant' contextual cues. In belief bias tests, System 1 is said to be evident in 'the tendency to contextualize all problems with reference to prior knowledge elicited by contextual cues' (Evans, 2006, p.380). Stanovich and West have described System 1 as a 'radical contextualizer,' while System 2 works to 'decontextualize and depersonalize' (Stanovich and West, 2000, p.659).

Similarly, and as will be reviewed in detail below, a major emphasis in the cultural analytic – holistic literature has been on cultural differences in attention to context, such as visually attending more to the context of objects (e.g. Masuda et al., 2007; Masuda et al., in press; Masuda and Nisbett, 2001, 2006; Miyamoto, Nisbett, and Masuda, 2006), attributing more causal power to context (e.g. Lam et al., 2005; Masuda et al., in press; Masuda and Kitayama, 2004; Miller, 1984; Miyamoto and Kitayama, 2002; Morris and Peng, 1994), automatically binding objects to the context (Masuda and Nisbett, 2001), and being more subject to belief bias effects (Norenzayan et al., 2002). In regards to this element of System 1-2 differences, then, the similarities with cultural psychology's definitions of holistic-analytic differences are striking.

Another (weaker) link between dual-processing and cultural psychology definitions of the two systems is how they are connected to social relations. System 1 has sometimes been described as 'interactional intelligence,' and as resulting in task construals that assume conversational norms (Stanovich and West, 2000). In the cultural psychology literature, a strong connection between holistic processing and attention to social relationships has been noted. The relative emphasis on holism in the East

[1] In the following pages, 'analytic' and 'holistic' will be used to describe the modes of thought elaborated on by cultural psychologists; and as with many other authors in this book, we will use 'System 1 and 2' to refer to dual-process theories, as variously defined as they are.

and analytical thinking in the West is proposed to have roots in these cultures' differing emphasis on interpersonal relationships (Nisbett et al., 2001). In the relatively collectivistic cultures of East Asia, attention paid to social relationships—both relationships between 'objects' (people) and one's role within the social field—may train similar habits of processing when attending to non-social objects. In the relatively individualistic cultures of the West, on the other hand, the cultural training to regard oneself as independent of others is reflected in the cognitive tendency to attend to decontextualized objects. Priming studies have supported this cultural explanation. Temporary increases in holistic processing can be brought about simply by asking participants to think of themselves as parts of social relationships, while similar increases in analytic processing are brought about by thinking about oneself as independent of others (e.g. Cha, 2007; K. Kim and Markman, 2006; Kühnen and Oyserman, 2002). It is social situations, where one is considering one's relationships with others, that seem to bring holistic processing to the fore.

Differences: Automatic versus controlled, natural versus normative

Despite these similarities, there are other aspects of the dual process literature that do not match neatly with the holistic-analytic theories of the cultural psychologists. System 2 is generally defined as more than simply a decontextualizing way of thinking. It is also described as more deliberative (i.e. explicit and time-consuming), and its use is associated with greater intelligence, ability to control one's thoughts and follow directions, and 'cognitive flexibility' (e.g. Evans, 2003, this volume; Sloman, 1996, 2002; Smith et al., 1992; Stanovich and West, 2002, p.438; Stanovich, this volume). For example, Evans states that 'it is [both] abstract reasoning and the ability to comply with instructions' that characterizes those high in System 2 use (Evans, 2003, p.457). Especially in this volume (e.g. Evans, Stanovich), System 2 is overwhelmingly described as a method of overriding the 'default responses' given by System 1. Stanovich and West have called our automatic tendency to contextualize problems a 'fundamental computational bias' that System 2 allows us to control (Stanovich, 1999; Stanovich and West, 2000, 2002). System 2 is seen as the controlled, effortful, generally explicit thinking that can, but does not always, override the results of System 1 thinking, checking if the latter produces 'sensible' output.

Stanovich and West have shown (among Western populations) that although greater intelligence leads to a greater ability to use System 2 thinking, the actual use of System 2 thinking is also greatly dependent on personal preference or 'thinking style' (e.g. Stanovich and West, 2000, p.707). Evans (2006; this volume) has suggested that analytic and holistic might be best understood as thinking styles. By this conceptualization, Holistic is not System 1, and Analytic System 2; instead, they are individual variation in using System 2: 'Styles are … a (variable) property of the system (System 2) that employs epistemic and response regulation because its goals are flexible' (Stanovich and West, 2000, p.708). By this definition, while everyone can and does engage in System 1 thinking, the use of System 2 thinking is dependent on, first, ability, and secondly, choice: '… some people do have the cognitive flexibility to decouple unneeded systems of knowledge and some do not … those who do have the

requisite flexibility are somewhat higher in cognitive ability and in actively open-minded thinking' (Stanovich and West, 2000, p.662). Similarly, Evans has described thinking style as being largely a matter of choosing, or not choosing, to engage in effortful re-checking of intuitive assumptions: 'Intuitive thinkers, for example, may be predisposed by personality or by cultural context to accept uncritically default judgments that are generated heuristically, whereas analytic thinkers may be more inclined to check them out with explicit reasoning' (Evans, 2006, p.383).

The idea that cultural differences in analytic-holistic thinking reflect different preferences for object versus context-oriented thinking—i.e. differences in normative style rather than innate ability—is not problematic for cultural psychologists. However, the characterization of holistic thinking as no more than a choice to not engage in System 2 thinking is theoretically problematic. Rather than conceiving of holistic thinking as being the absence of System 2 thinking, cultural psychologists have traditionally conceived of holistic thinking, as it is observed in East Asian contexts, as a trained, culturally-elaborated form of thinking in its own right.

This culturally-learned aspect of the analytic-holistic definitions suggests another disconnect between the dual-process and cultural psychology conceptualizations. Both Sloman (1996) and Stanovich and West (2000), for example, propose that System 2 thinking is taught formally and has its source in culture, while System 1 thinking is learned simply through exposure or personal experience. Similarly, Sloman cites Evans and Over (1996) as describing System 2 as 'adept at ensuring that one's conclusions are sanctioned by a normative theory' (Sloman, 2002, p.382). These characterizations of System 2 imply that if a way of thinking has its source in one's culture, and one checks one's System 1 thinking for whether or not it fits the culture's norms, then that is a kind of System 2 thinking, whether or not the actual norm is 'decontextualization.' In the cultural psychology literature, both analytic and holistic thinking are seen as elaborated in different philosophical and scientific cultural products, and taught both implicitly and explicitly through the culture (Koo and Choi, 2005; Nisbett et al., 2001). Presumably, East Asians may check their initial conclusions to see if they fit norms; but these norms may be holistic and dialectical, rather than analytical. If we take the 'culturally taught' aspect of System 2 definitions seriously, then holistic thinking may be a different cultural form of deliberate, System 2 thinking; contextualizing, but taught.

Cultural psychologists do agree that Western culture has encouraged the use and elaboration of a decontextualizing thinking process in a way that other cultures have not. It seems unlikely, however, that only Western culture encourages effortful, deliberative thinking to 're-check' one's initial thinking. It seems more likely that the decontextualizing System 2 described by dual-process theorists is one version of a normative form of effortful thinking, and that in other cultures with other norms, other forms of effortful second-guessing of System 1 thinking may occur. In this case, we suggest that while East Asian culture may not encourage decontextualized thinking as much as Western culture encourages it, conversely, Western culture does not encourage holistic, dialectical thinking. These culturally different norms for 'good thinking' may both sometimes lead to effortful corrections of initial models, though in opposite directions on the contextualizing/decontextualizing continuum. Moreover

(and perhaps less controversially), as culturally-trained modes of thinking, both holistic and analytic modes of thinking can become automatic and effortless: overlearned cultural rules that have become habits.

However, these are differences in theories. Is there evidence that East Asian thinking, while holistic, is not merely an effortless 'default' to intuitive thinking; and that Western analytical thinking is not necessarily effortful, explicit thinking? In the following pages, we will see that the terms 'holistic' and 'analytic' are umbrella terms for cultural differences found in a large number of different cognitive tasks. These tasks vary in their applicability to traditional dual-process models. While some of these cognitive tasks offer evidence that holistic thinking may sometimes be less effortful than analytical thinking, not all of these tasks fall easily into analytic-effortful, holistic-effortless categories.

Review of relevant research

Rule-based versus associative thinking

Our own past research has, in fact, assumed a strong correspondence between dual-process reasoning theories and the analytic-holistic differences found in cultural research. Based mainly on Sloman's (1996) descriptions of 'associative' versus 'rule-based' reasoning, and the contextualizing/decontextualizing aspects of these definitions, Norenzayan, Smith et al. (2002) hypothesized that East Asian participants would be more likely to show biases towards giving contextualized, associative System 1 answers to classic tests. A series of studies (Norenzayan, Smith et al., 2002) showed that when contextual information led to conflict with abstract rules, East Asians did show larger effects of exemplars, concept prototype, category family resemblance, and belief plausibility compared to North Americans, even when; (1) no differences were found in abstract deductive reasoning abilities with no content; and (2) told explicitly to follow an abstract rule.

For example, in one study (Norenzayan, Smith et al, 2002, Study 1), participants were given the task of categorizing objects, such as novel 'alien' animals, according to a rule that determined category membership (whether the animal lived in Saturn or Venus). East Asians and European Americans showed equal performance; until, as participants became more familiar with the task, information from exemplars occasionally conflicted with the rule (e.g. an alien that looked very similar to previous Saturnian was in fact a Venutian by the rule). In these cases, American erroneously followed the exemplar rather than the rule about 11% of the time; East Asians showed an exaggerated effect of the influence of the exemplar, ignoring the rule about 25% of the time. In this task, both Koreans and Americans knew that the explicit directions were to follow a complex rule in order to classify the objects. From these results, it appears that East Asians found the exemplar information more 'tempting' to use than did Americans. It appeared that Koreans were less used to subduing associative information such as exemplars in favor of abstract rules, and so this may be seen as a test of the ability to disregard contextual information.

In a second study of 'spontaneous' categorization strategies, participants were asked to categorize objects as being similar to one or another group of objects (Norenzayan,

Smith et al., 2002, Study 2). Participants could either note that one attribute (e.g. stem length) was the same across all members of the group, and use that one feature as the basis of classification, or they could use family resemblance (similarity based on several features that were more common in one group than the other, without any one feature being necessary for group membership). Results showed that participants who had more exposure to East Asian culture were more likely to use family resemblance than the single attribute as a method of classification, suggesting that East Asian culture encouraged attention to family resemblance structure rather than attending to one deterministic feature only.

In two more studies, Norenzayan, Smith et al. (2002) also showed that participants with more exposure to East Asian culture were relatively more sensitive to the content of the conclusion of an argument, rather than its underlying abstractly logical nature, in evaluating convincingness and logical correctness. For example, it is commonly found that an argument extending arbitrary features (e.g. having an 'ulnar artery') from a superordinate category (e.g. birds) to subordinate categories is seen as more convincing when the members are typical (e.g. eagles), rather than atypical (e.g. penguins) (Sloman, 1996). This tendency to attend to content to evaluate convincingness (instead of evaluating the argument on purely abstract, logical grounds) was exaggerated among Koreans and, to a lesser extent, Asian Americans, as compared to European Americans. Similar results were obtained with the classic 'belief bias' test. When evaluating arguments for logical consistency, Koreans were more likely than Americans to mark unbelievable but logically correct arguments as logically invalid, showing greater 'belief bias' in their evaluations. However, it is important to note that when evaluating abstract forms of these arguments (with letters and nonsense words, rather than content), there were no cultural differences in accuracy in logical reasoning. It is only when the believability of the content of the argument conflicted with the logical correctness of the argument that Koreans were, on average, more influenced by the believability of the conclusions. Once again, these studies suggested that exposure to Western culture influences participants to more easily, and more commonly, separate content and past experience from abstract rules.

In sum, these studies showed that when put in the position of choosing between sensitivity to contextual cues and associations of features *or* abstract rules and a single deterministic feature, participants who were closer to East Asian cultures were more sensitive to the former than were participants who were less influenced by East Asian culture. Though no mediators of this difference were measured other than cultural background, similar performance in control tasks suggests that it is unlikely that this is a difference of intelligence or general self-control. Instead, it is most likely that it was a result of differential levels of practice in ignoring contextual, holistic, and experience-based information in favor of abstract rules.

Perception: Evidence for automatic analysis and expert holism

The above studies used classic decontextualization tests to examine hypotheses based firmly on dual-process theories, specifically looking at what happens when context and decontextualized rules are in conflict, and the normative response is to follow the rule.

The majority of research in the analytic-holistic tradition, however, has looked not at conflicts between context and abstract rules, but at differential attention to objects versus to the context.

Some of the most productive and interesting work to come out of the holistic-analytic paradigm has been in the area of perception. Multiple studies have shown that even at the basic level of attention and vision, exposure to Western culture appears to facilitate attention *primarily* to focal objects, automatically separated from their context, while exposure to East Asian culture facilitates attention to context as well as focal objects, and to automatically associate objects within the context. As opposed to many dual-process tasks where the normative response is decontextualizing, tasks have been developed in which the normative response requires attention to context. As one might expect if East Asians have been trained to take better account of context and relationships, East Asians tend to do better on these tasks; when given tasks that require attending to focal objects and ignoring their relationship to context, Westerners tend to do better.

Some of the first hints of these attentional differences came from work by Masuda and Nisbett (2001). In one study, Japanese and American college students were simply asked to describe a scene similar to the now common 'aquarium' screen savers. Japanese participants tended to describe background objects such as the aquarium floor or small, unmoving snails much more than did Americans, while Americans and Japanese were equally likely to mention the animals placed at the foreground of the aquarium scene, such as large fish and energetic newts. These open-ended descriptions of the scene suggested that Americans were relatively 'context-blind' compared to Japanese, who were attentive to both focal and background objects. Masuda et al. (2001) come to the surprising conclusion that 'Japanese may simply see far more of the world than do Americans.' Further work by Masuda and colleagues (in press) has extended this work, showing that the differential attention is motivated by what is regarded as relevant information. Eye-tracking studies showed that when Americans and Japanese judged the emotion of a central figure in a group of people, Japanese participants looked at the emotions on the faces of other figures more than did Americans, and took this information into account when judging the emotion of the central figure (Masuda et al., in press). This kind of higher-level task suggests that Japanese were following a 'holistic rule;' they believed that in order to accurately judge a focal object, its relation to objects in the context must be taken into account. Americans, on the other hand, did not find the contextual information to be as important, as indicated both by their pattern of eye-movements and also by the fact that they did not take others figures' emotions into account when judging the emotion of the central figure.

Though in the above studies the choice to attend to contextual information (or not) appears to be volitional, other studies have indicated that both of these culturally-influenced tendencies can be difficult to control. Masuda and Nisbett (2006) carried out a series of 'change blindness' tests, where participants looked at pairs of scenes that were slightly different from each other, and tried to identify all differences between them. The average time taken to notice changes in the focal objects was the same among Japanese and Americans, but Japanese took significantly less time to

note the contextual changes than did Americans, leading to them noticing more changes overall. Although both groups knew that changes could be occurring in the context, Americans took longer to drag their attention away from the focal objects, suggesting that ignoring context was habitual and automatic. On the other hand, eye-tracking studies testing the ability to *not* attend to the context replicated the results of Norenzayan, Smith et al. (2002): just as East Asians had trouble ignoring contextual information in conceptual problems, they also had trouble ignoring context in perceptual problems. When participants were requested to keep their eye on a central dot and ignore dots that occasionally flashed in the surrounding area, eye-tracking revealed that Japanese were less able than Americans to prevent their attention from wandering to the surrounding flashing dots (Masuda et al., 2007). In other words, while contextualization in the area of perception may be automatic for many East Asians, decontextualization (ignoring of the context) appears to be automatic for many Westerners.

Another lesson of the above studies is that different training in contextualization can result in individual differences in the *ability* to pay attention to context. While many dual-processing paradigms test for individual differences in the ability to decontextualize, testing the ability to take context into account also reveals individual differences. For example, the 'Framed Line Task' measures both contextualizing and decontextualizing abilities separately (Kitayama et al., 2003). Looking first at a square with a line drawn down its center, participants are given the task of drawing a similar line inside a blank, differently sized square. Participants are instructed to either draw a line that is the same size as the first, *relative* to the square; or they are instructed to draw a line that is *absolutely* the same length as the first, regardless of the size of the squares. The accuracy with which they perform these two tasks, one of which requires taking relative object-context comparisons into account and one of which requires ignoring context, is compared. In these tests, Japanese participants perform better than Americans on the relative task, while Americans perform better than Japanese on the absolute task.

In sum, the above studies provide evidence for the rather amazing idea that cultural experiences can influence our visual perception of the world around us—what we see. They also show that decontextualization, which is the principal feature of analytic thinking by the cultural definition, is sometimes a habit that takes effort to overcome; and that contextualization can be measured as a skill, with individual differences in ability.

Person perception: Direct evidence for effortful holism

But what about more conceptual kinds of information? Do East Asians consider more information in general than do Westerners? And how well do these higher-level processes map on to dual-process definitions?

Analytic and holistic ways of thinking have also been shown in person perception, where Americans tend to ignore situational information more than East Asians. As seen above, analytic thinking causes an automatic concentration on objects as separated from their context; in person perception, this translates to a concentration on personality and disposition (internal, situationally invariable attributes of each person), and a disregard for the effects of the situation. As a result, Western participants

are more likely to be subject to the Correspondence Bias (or the Fundamental Attribution Error): the tendency to attribute a person's actions to their disposition, while discounting the effect of the situation (Choi et al., 1999; Masuda and Kitayama, 2004).

In a series of studies examining prediction of behavior, Norenzayan, Choi, and Nisbett (2002) found that Koreans predicted stronger situational effects on behavior than did Americans. For example, if a person was considering giving a dollar to someone needing to buy a bus ticket, Koreans predicted that practical constraints—such as whether or not he had more money for his own bus ticket—would have a stronger effect on his behavior than did Americans. Koreans and Americans also had different 'lay theories' about behavior, with Koreans more likely to state that behavior was strongly controlled by the situation than Americans. This cultural difference was also found in studies on *explanation* of behavior (Choi et al., 2003). For example, when Koreans and Americans read about a graduate student who had killed his advisor, and then were given a list of about 100 pieces of information that might be relevant for explaining the muderer, Koreans considered a larger number of the clues to be relevant than did Americans: when asked to exclude clues that were definitely not relevant, Americans expurgated about 60% of the items, while Koreans excluded only about 30%.

In these studies, it is important to note that the choice to attend to situational information appears to be conscious and deliberate. East Asian and Western cultures teach different lay theories about the importance of the situation, which participants then use to decide what information is relevant for predicting and explaining others' behavior. This is commonly part of the definition of System 2 thinking (Sloman 1996; Stanovich and West 2000). Contrary to most definitions of System 2 processes, however, in East Asian culture the rule is to *attend* to situational information, not to 'decontextualize' the person from the situation.

More direct evidence that holistic use of conceptual information can be motivated and effortful comes from research on cultural differences in the Fundamental Attribution Error (FAE) and Correspondence Bias (CB). In the Western literature on the FAE or CB, the choice to contextualize the person—to pay attention to situational constraints on a person's behavior—has been shown to be an effortful, cognitively demanding process, as participants correct for their automatic dispositional attributions (Gilbert et al., 1988). East Asians have been shown to be less likely to exhibit FAE and CB (Choi et al., 1999; Masuda and Kitayama, 2004; Morris and Peng, 1994). Does this mean that East Asians are engaging in an effortful correction for a dispositional attribution, or does it mean that East Asians are less likely to make the analytical dispositional attribution in the first place? The evidence, as we will see below, suggests that East Asians also make an automatic dispositional attribution, and then explicitly correct for it; the correction itself, however, is partially automatic as well, likely a trained response.

In Masuda and Kitayama (2004) and Miyamoto and Kitayama (2002), the correspondence bias—assuming that one's actions reflect one's disposition, rather than the situation—is shown to be a more persistent bias among Americans than Japanese. In the classic CB tests, participants read an essay that, they are told,

was written by another student who was asked to make a certain argument in their essay. After reading the essay, participants are asked how much the student actually believes what he/she said in the essay. American participants tended to display more CB than Japanese participants, attributing the student's behaviour to his/her own opinion, and being unaffected by knowledge of situational constraints.

Seeking direct evidence that the cultural difference in CB was due to explicit consideration of situational constraints by Japanese participants, Miyamoto and Kitayama (2002) asked participants to list the thoughts that led to their rating of the student's true belief. Japanese listed more cognitions about the situational constraints than Americans did. Moreover, at the individual level, the number of situation-referencing cognitions mediated the cultural difference, suggesting that the decision to use contextual information explains the cultural difference. This indication of explicit, effortful holism is also supported by the fact that under cognitive load, Japanese began to show evidence of adopting a situation-blind view (showing CB). However, even under the cognitive load, Japanese still showed CB to a significantly smaller degree than did Americans, suggesting that the cultural difference may also be partially due to an *automatic* tendency to attend to situational information among Japanese. In these studies, then, a situational attribution is more effortful for both cultures, and is more often made by Japanese; but among Japanese, the situational attribution appears to be somewhat resistant to cognitive load, suggesting that it may also be partially an automatic process.

More evidence that situational corrections for dispositional attributions can be automatic came from research by Knowles and colleagues (Knowles et al., 2001), where Hong Kong students put under cognitive load did *not* make more dispositional attributions than Hong Kong students not under cognitive load. American students under cognitive load, on the other hand, made a much larger dispositional attribution than American students not under cognitive load. This showed that for the American students, that situational correction was an effortful process, while for Hong Kong students, the situational correction was automatic, occurring even when they were cognitively busy. However, because Hong Kong students did not become *more* situational under cognitive load, the authors concluded that for both Hong Kong and American students, the initial automatic attribution was in fact to the disposition, and then both cultures later made a situational correction for that attribution; the difference between the cognitive load conditions was caused by the Hong Kong students' practiced situational attribution, which, presumably due to cultural influence, had become automatic.

The fully-automatic situational correction among Hong Kong students and partially-automatic situational correction among Japanese students appears to be evidence for an 'overlearned' rule, one that has become part of the automatic habits of thought but had to be learned through cultural influence. Americans, on the other hand, must always engage in effortful thought to make a situational attribution, presumably because of the cultural emphasis on ignoring context. These cultural differences in CB are especially important for showing how tasks attributed to analytic-holistic thinking styles can be quite different from the definitions usually given

to System 1 (holistic *and* automatic) and System 2 (analytic *and* effortful). In the case of CB and FAE, Westerners must engage effortful thinking in order to overcome an automatic, analytical attribution; East Asians show evidence of consciously thinking about the situation in order to overcome what would otherwise also be an automatic dispositional attribution, and show evidence of having learned an attention-to-situation rule in order to correct initial dispositional attributions.

Norms: Culturally-elaborated and learned holism

A further reason to believe that the cultural definition of holistic thinking may not be the same thing as System 1 thinking lies in the way a culturally-elaborated holistic way of thinking can be learned. As previously discussed, in some dual-process accounts of reasoning, System 1 is not defined as a kind of thinking that needs to be taught, but only avoided or not depending on use of System 2 (Evans, 2003, 2006; Stanovich and West, 2000). In the cultural psychology literature, however, holistic thinking is conceptualized as something that can be developed, learned and trained. This kind of culturally-elaborated holistic thinking involves greater attention to context, and also includes dialectical thinking: expectations of flux and contradiction, rather than linear change. In Koo and Choi (2005), for example, in which Korean students in Oriental Medicine were compared to Korean students in psychology, longer training in Oriental Medicine (but not in psychology) was associated with more dialecticism {i.e. predictions of dialectical, rather than linear, change, as in \Ji, 2001 #135}, and also with endorsement of more clues as possibly relevant to solving a crime (as in Choi et al., 2003). Students of Oriental Medicine had been taught to adopt a consciously holistic and dialectical stance: they were trained to attend to 'maintain[ing] the dynamic balance of organs,' and to interpret symptoms as results of holistic interrelations among organs (Koo and Choi, 2005, p.1265).

A new Analysis-Holism Scale (AHS, Choi et al., 2007) has also shown that holistic thinking can be an explicitly adopted set of beliefs. The AHS measures individual differences in endorsement of four subscales: holistic Causality (e.g. 'Everything in the world is intertwined in a causal relationship'), dialectical Attitudes towards Contradictions (e.g. 'It is more desirable to take the middle ground than go to extremes'), dialectical Perception of Change (e.g. 'Current situations can change at any time'), and holistic Locus of Attention (e.g. 'It is more important to pay attention to the whole than its parts') (Choi et al., 2007, p.694). As expected, endorsement of AHS items was higher among Korean than American students, and also higher among Korean students studying Oriental Medicine than other Korean students. Among Koreans, individuals with higher AHS scores tended to score higher on other measures of relevant thinking styles (such as 'attributional complexity,' a 'global' thinking style, and a 'compromising' approach to conflict), were more likely to categorize objects based on family resemblance (as in Norenzayan, Smith et al., 2002), and were less willing to exclude 'irrelevant' clues in a murder case (as in Choi et al., 2003). These findings suggest that holistic thinking can consist of an explicitly adopted, culturally taught set of beliefs about the proper way to react to conflict, predict change, attend to context, and perceive causal relationships in the world.

But one more potential similarity: Nonverbal thinking?

Another commonly mentioned (though also controversial; e.g. Evans, this volume) difference between System 1 and 2 thinking is how *explicit* it is. System 1 processes are generally seen as ones that cannot be 'actively perceived' by the conscious mind; only the results of these processes can be brought consciously to mind (Evans, 2003; Sloman, 2002). In contrast, System 2 thinking is supposed to progress through a consciously controlled route, each step occurring in the conscious mind and therefore explicit and verbalizable.

H.S. Kim and colleagues (2002) have shown that in comparison with East-Asian Americans, Caucasian Americans are more likely to identify talking with intelligence and 'good thinking.' This suggests that part of the reason that System 2 is often identified as being a 'verbal,' 'conscious' system may be because of a Western, pro-verbal bias to associate intelligent thought with verbalization (though see Evans, this volume, for caveats on the System 2 – explicit thinking connection).

Perhaps coincidentally, then, H.S. Kim (2002) has indeed found evidence that Westerners are more likely to verbalize thought than East Asians. In these studies, participants were asked to complete Raven's Matrices tests, either silently or by speaking their thoughts aloud. East Asians' thinking was disrupted by speaking their thoughts aloud, as reflected in poorer performance on Raven's Matrices, while European Americans' performance was not. Moreover, when required to recite the alphabet while solving Raven's Matrices (thus suppressing other forms of verbal thought), European Americans' performance was disrupted, but East Asians Americans' performance was left intact (both groups were students at Stanford University, and all indicated that their native/dominant language was English). These studies suggested that at least when carrying out the thinking required to solve Raven's Matrices, East Asian Americans' internal thought processes were less likely to be verbal. East Asian Americans were also more likely to describe their own natural thinking as less 'verbal' than were Americans. In fact, individual differences in self-reported internal verbalization of thought, as well as self-reported views on the connection between speaking and intelligence, were found to mediate the effect of culture on the disruptive effect of speaking one's thoughts aloud.

The exact connection between thinking 'holistically' and thinking non-verbally was not made in these studies. However, the studies do show that one's culture can influence whether talking is seen as an indication of good thinking, and, consequently, how much internal (and external) verbalization takes place when one thinks. Whether or not this is causally connected to using associative, contextualizing, holistic thought processes that require non-verbalization—versus a different set of cultural effects, related directly to verbalization—is still an open question.

Similarities and differences: Summary

Although not fully exhaustive of all research that has been done in the analytic-holistic cultural psychology tradition, the above summary of studies shows some important similarities and differences to common conceptualizations of dual process models. Similar to theories that concentrate on the 'decontextualizing' aspect of System 2 and

the 'associative, holistic, contextualizing' aspect of System 1, holistic East Asians have been shown to have more difficulty ignoring past experience in favor of abstract rules or logic, and to more easily shift to categorizing based on family resemblance rather than single features (Norenzayan, Smith et al., 2002); East Asians also are more likely to automatically bind an object with its context, while Westerners are more likely to decontextualize the object (Masuda and Nisbett, 2001). In agreement with theories that describe System 1 as only posting the end result of a thinking process to the conscious mind while System 2 processes are fully conscious, there is evidence that East Asians may think less verbally than Westerners (H. S. Kim, 2002). And in agreement with descriptions of System 2 as being an ability to control attention to context, East Asians find it more difficult to avoid looking at contextual flashing dots than do Westerners (Masuda et al., 2007).

However, there are many aspects of the above studies that do not fit neatly into the dual-process categories. Though dual-process theories identify the tendency to contextualize as an automatic process, we have seen evidence that paying attention to context can be done deliberately, consciously and in line with lay theories of what one ought to attend to (Choi et al., 2003; Masuda et al., in press; Masuda and Kitayama, 2004; Miyamoto and Kitayama, 2002; Norenzayan, Choi et al., 2002), and as a correction to an automatic decontextualization (Gilbert et al., 1988; Knowles et al., 2001; Miyamoto and Kitayama, 2002). Though dual-process theories identify the decontextualizing System 2 as the only thinking process that is taught through formal education, we have seen that dialectical, holistic attitudes are learned by students of Oriental Medicine (Koo and Choi, 2005), and that holistic beliefs are culturally elaborated (Choi et al., 2007). Though dual-process tests generally test one's ability to decontextualize, we have seen that the *skill* of paying attention to context and relational information is better developed among East Asians (Kitayama et al., 2003; Masuda and Nisbett, 2006). Overall, holistic thinking does not appear to be best described as a tendency 'to accept uncritically default judgments that are generated heuristically' (Evans, 2006, p.383); instead, it can be conscious and norm-following, but with an eye to paying *more* attention to context rather than *less*.

Implications

These connections and disconnects have implications both for analytic-holistic and dual-process theories. First, cultural psychologists may benefit from clearer distinctions between four categories: automatic holistic and analytic habits of thought, versus more conceptual, conscious, rule-following holistic and analytic thinking (see Table 10.1). It is possible that examining these four categories in turn would lead to better explanations for the sources of cultural differences, as different elements of cultures may influence the development of less and more cognitively demanding kinds of analytic and holistic thinking. Though East Asian holistic thinking does encourage cultural participants to attend to context and relationships, this way of thinking is not necessarily intuitive or unconscious, and not all descriptions of System 1 thinking apply to all kinds of East Asian holistic thinking. Secondly, dual-process theorists could begin to explore the question of under what circumstances System 2-like

Table 10.1 Selected cultural psychology references illustrating four categories of analytic and holistic thinking

	Decontextualized	**Contextualized**
Effortful/volitional/skilled/culturally taught/verbal	Choi et al., 2003 H.S. Kim, 2002 Kitayama et al., 2003 Norenzayan, Smith, et al., 2002 Norenzayan, Choi, et al., 2002	Choi et al., 2003 Choi et al., 2007 Kitayama et al., 2003 Koo & Choi, 2005 Miyamoto & Kitayama, 2002 Norenzayan, Choi, et al., 2002
Effortless/automatic/nonverbal	Masuda & Nisbett, 2006 Miyamoto & Kitayama, 2002 Knowles et al., 2001	Norenzayan, Smith, et al., 2002 Masuda et al., 2007 Knowles et al., 2001 H.S. Kim, 2002

thought processes (namely, effortful and deliberative) might actually involve contextualization rather than decontextualization. This suggestion to cross 'effortful/deliberative' and 'contextualizing' echoes Moshman (2000), who suggested that crossing heuristic/rule-following and automatic/explicit dimensions could better explain certain evidence about reasoning in the developmental literature.

Further directions: Effortless, but aware, thinking?

In our effort to elaborate on how holistic thinking can be rule-following and deliberative, however, we do not want to fall into a possible trap of applying Western values about effortful thinking to East Asian thinking. It is possible that the East Asian concentration on absorbing more, rather than less, information necessarily leads to the use of a more unconscious, general-use associative system that has greater processing capacity than deliberate thought. Though we have a large amount of evidence that suggests that East Asians are better able, and more likely, to pay attention to more (contextual) information, we do not have very good insight into what process of thinking this conscious choice leads to. In studies on the advantages of unconscious thinking, Dijksterhuis and colleagues have suggested that decisions requiring consideration of more information are best processed unconsciously (Dijksterhuis et al., 2006). Even if not all forms of what cultural psychologists call 'holistic thinking' are the associative, effortless processes described in many System 1 theories, it is very possible that even the conscious holistic thinking that has been detailed above leads to more use of unconscious, less effortful thinking. Moreover, it is possible that this kind of thinking is seen as advantageous in East Asian cultures. Recent evidence that East Asians are more admiring of decision-making based on intuitions than are Westerners is supportive of this proposal (Buchtel and Norenzayan, 2007).

Generally speaking, a differential emphasis on the usefulness of intuition versus logic has been noted in East Asian versus Western philosophy (Becker, 1986; Lloyd, 1990, 1996). The development of formal logic, as well as other rule-based systems such as Euclidian geometry and theoretical models to explain physical and biological phenomena, was a feature of Greek philosophy that heavily influenced the development of Western thought (Lloyd, 1990). Expert analytic thinking may be advantageous in situations where argumentation and the cutting away of irrelevancies are emphasized, and thus lionized in societies where debate is important, such as the Ancient Greek-influenced West, or where objective and analytical thought is expected, such as in many work situations in the West (Sanchez-Burks, 2002).

As the idea of expert analytic thinking was elaborated on in the West, the idea of expert intuitive (and effortless) thinking may have been developed in the East. For example, the Taoist and Confucian spiritual ideal of 'wu-wei' or 'effortless action' is a kind of intuition, and yet is more complex and sophisticated than the Western idea of intuition as a 'snap judgment' (Dijksterhuis and Nordgren, 2006, p.106; Slingerland, 2000, p.300). Epitomized by Confucius' reputed ability, perfected at the age of 70, to perform rituals and to interact with others in an effortlessly harmonious and flexible way, 'effortless action' is a kind of expert intuition that allows one to engage in perfect, effortless deliberation and immediate response. Similarly, meditation practices in the Buddhist tradition emphasize a kind of non-directed awareness of thoughts, a kind of thinking that is not effortful, and yet is conscious (Marlatt, 2006). Effortless thinking, then, may be held in higher regard in East Asian society because of philosophical traditions in which intuition is understood as complex and based on expert knowledge.

Another reason that intuition and holistic thinking might be more valued in East Asian than Western culture is that expert (i.e. informed by experience, automatic) forms of this kind of thinking may be objectively more successful at solving the social-environmental problems that are more prevalent in East Asian societies than Western societies. Among those factors believed to create and sustain the cultural differences in cognition is the degree to which different cultures encourage interpersonal modes of being (Fiske et al., 1998; Nisbett et al., 2001). Cultures such as those of East Asia may require greater attention to 'relationships and subtle changes in social situations' (Masuda and Nisbett, 2001, p.923), thus favoring holistic habits of thinking.

Consistent with this reasoning, as briefly described above, Western subjects exhibit increases in holistic cognitive processing after being primed with an interdependent self-construal, while East Asian subjects move towards analytic thinking when primed with independent self-construal (Cha et al., 2005; Kühnen et al., 2001; Kühnen and Oyserman, 2002). The link between intuitive processing and successful social inference, such as detection of nonverbal cues, has also been supported by their mutual dependence on brain structures required for implicit learning (Lieberman, 2000). Importantly, recent studies have suggested that in complex situations, intuitive, holistic thinking has a distinct advantage over conscious, analytic reasoning (Dijksterhuis, 2004; Dijksterhuis et al., 2006; Dijksterhuis and Nordgren, 2006; Dijksterhuis and van Olden, 2006). Societies in which social success depends on attentiveness to subtle social cues in complex interpersonal environments, may explicitly encourage the

mode of thinking that leads to better detection of such cues, namely unconscious, automatic, holistic thinking.

Conclusion

The strongest lesson that cultural psychologists wish to communicate is that in order to make conclusions about the 'human mind,' researchers must expand the net of their research to include humans from cultures other than their own. Given the Western cultural emphasis on analytical thinking, it behooves us to consider to what extent our own culture has biased the development of dual-process reasoning theories. Are analytical, effortful, deliberative, and explicit thinking processes always tied up with each other, or is that more likely to occur in Western minds than others? Conversely, there is room for dual process theories of thinking to inform cross cultural research in a more systematic manner (reflecting System 2 reasoning, one might say!). Such cross-fertilization between cultural research and cognitive models of the mind can expand the reach of dual process theories, and refine the cultural psychologist's operationalization of human thinking across cultures.

Dual-process theories are certainly still in a period of development (as evidenced by new advances described in this volume). We hope that this summary of studies, showing cultural variation in reasoning, encourage dual-process theorists to test out their theories in non-Western cultures. The particular combinations of historical and social environments that characterize different cultures may have given rise to particular ways of thinking that are worthy of exploration. Common Western definitions of System 1 and System 2 thinking may be only one of them.

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