

# Mathematical Eyes on Intercultural Communication Processes

Mara Alagic  
Mathematics Education  
College of Education  
Wichita State University  
Wichita, Kansas 67260-0028, USA  
E-mail: mara.alagic@wichita.edu

Glyn Rimmington  
Office of Global Learning  
College of Education  
Wichita State University  
Wichita, Kansas 67260-0142, USA  
E-mail: glyn.rimmington@wichita.edu

## Abstract

This paper provides three different ways of visualizing intercultural communication processes: a visual metaphor named Cage Painting, an active listening model, and the Dialectic Flow of thinking. Each of these representations captures some unique characteristics of communication processes and contributes in a different way to our understanding of intercultural communication and its inherent challenges.

## Introduction

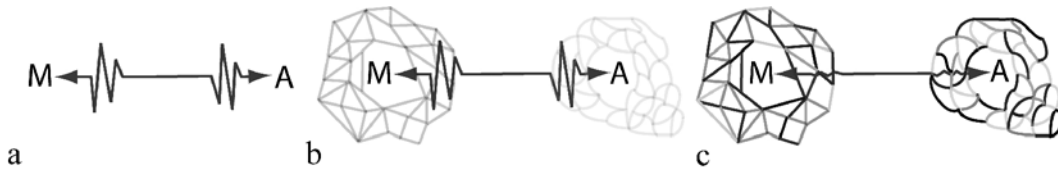
In both the context of the urban school with culturally diverse classes and in the context of global interactions, intercultural communication can be a challenge, especially for the uninitiated. Conversations or collaboration with people from a cultural background different to our own is no longer just in the realm of the business executive or the professor on sabbatical. Educators at all levels are beginning to recognize the need to infuse the curriculum with experiences that will prepare learners for an increasingly interdependent, interconnected and culturally diverse world.

This paper describes some essential elements of a Web 2.0-based approach to the preparation of learners for intercultural interactions and global learning experiences [5]. The approach moves beyond simply learning *about* other cultures or just superficial interactions with people from another culture toward achieving deeper, transformative learning in which participants develop multiple perspectives. Important elements of this learning include: a *visual metaphor*; *active listening* (Enryo-Sasshi) [2]; and *dialectic* flow of thinking [4]. Each of these elements will now be described and then applied to the interculture between mathematics and art.

## Visual Metaphor — Cage Painting

Mackay [3] introduced the *cage* as a visual metaphor to represent the effects of *life experience*, *cultural background* and *current context*, on how we communicate. It affects how we prepare messages for others and how we interpret messages from them. The bars of the cage may represent dimensions of culture, such as: *power distance*—the disparity of power distribution in the society; *uncertainty avoidance*—the degree of acceptance of uncertainty; *individualism-collectivism*—the degree of self- versus group-orientation; *masculinity-femininity*—the orientation towards aggressiveness; and *time orientation*—static tradition oriented versus dynamic future-oriented [1]. As we learn more about aspects of each of these for another person and for ourselves, we can think of the bars becoming more visible, representing our increased awareness of each other's characteristics. This process is called *cage painting*.

This process is captured in Figure (1a-c). Figure (1a) portrays misunderstanding in which the communication is being distorted as represented in the squiggles. The mathematician (M) and the artist (A) are having a misunderstanding. A metaphorical representation of the cause of the distortion—some invisible cages—is shown in Figure (1b). As the two characters discuss dimensions of their cultures—painting the cage bars—(Figure 1c), they are simultaneously taking each other’s perspective and understanding their own perspectives. This can help improve communication or at least reduce the chances of miscommunication. The process is never-ending. Cage bars need to be repainted and there are always more bars, so that while communication improves, it can never be perfect.

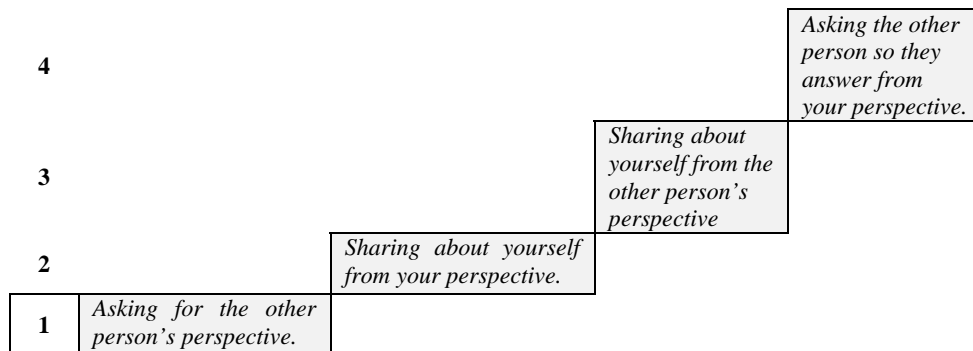


**Figure 1:** (a) something interferes with communication; (b) interference is caused by invisible cages; (c) painting cage bars can help avoid misunderstanding

### Dialectic Flow

Cage painting is about an ongoing intercultural conversation in which we formulate questions carefully to achieve a better understand each other’s view of the world. The questions may be about dimensions or dialectic pairs, such as *simple*<~>*complex*, *predictable*<~>*emergent*, *minimalist*<~>*elaborate* or *harmonious*<~>*discordant*. M and A will have different ways of interpreting each of these dialectic pairs. Each dimension will evoke different thoughts. Consideration of such dimensions can be regarded as a dialectic flow of thinking comprising recursion of the triplet *thesis-antithesis-synthesis*. In other words, an artist or mathematician’s work may first be considered as minimalist and then what minimalist is not, producing a synthesis somewhere in the set of possibilities between minimalist and elaborate. The synthesis serves as the thesis for the next recursion and so on. As the dialog recurs into finer detail of intercultural dialectic, the mathematician’s and artist’s cage bars become more opaque, which is a metaphor for them gaining a better understanding of each other’s view of the minimalist<~>elaborate dimension.

The questioning strategy that is associated with cage painting and achieving the dialectic flow has four levels (Figure 2). The first two strategies are relatively easy and involve asking for and sharing each other’s perspective on the particular dimension. The second two strategies require adoption of the other person’s perspective, which can be more difficult.



**Figure 2:** Cage painting questioning strategy

## Active Listening — Enryo-Sasshi Model

Another aspect the cage painting process is that of carefully formulating a communication in order to convey the intended meaning—*Enryo*—and also actively thinking about the possible interpretations of what the other person has communicated—*Sasshi* [2] (Figure 3). Therefore in our model of intercultural communication there are two levels. One level is concerned with the intended meaning to be communicated. The other level, the cage painting, is a form of meta-communication. Embedded in this meta-communication is active listening or Enryo-Sasshi. A closer look at the formulations and interpretations of multiple alternatives in this type of conversation involves dialectic thinking. During *Sasshi* the listener might consider multiple antitheses (what the thesis is not) for one thesis before reaching a synthesis that is shared in the *Enryo* phase. Both *Enryo* and *Sasshi* comprise dialectic recursion.

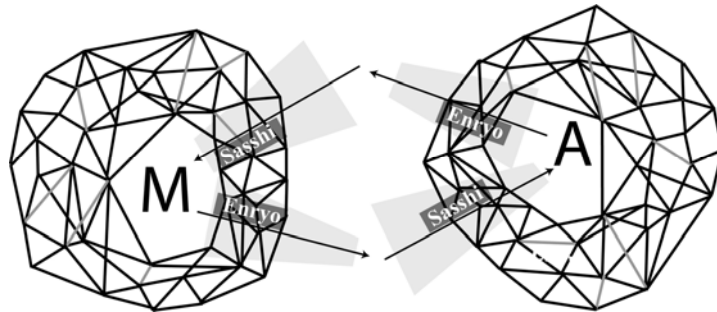
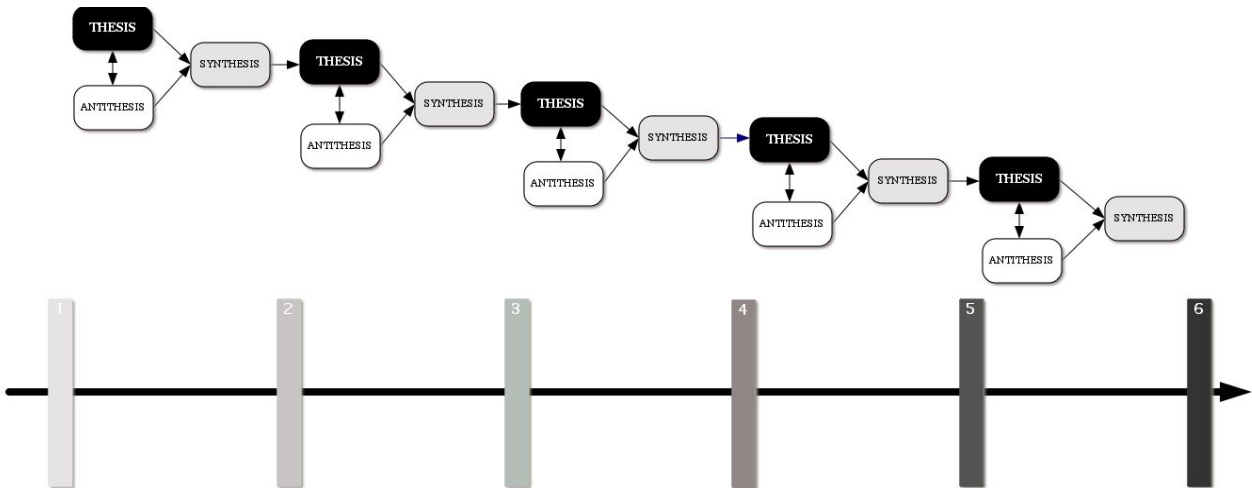


Figure 3: *Active listening, choosing how to convey intended meaning Enryo and interpreting possible meanings Sasshi.*

## The Mathematician and the Artist

Casting this in terms of an algebraic system for cage painting,  $\chi$ , we have:  $\chi = \{\omega, \eta, \beta\}$ , where  $\omega$  is the set of invisible cage bars,  $\eta$  is the dialectic recursion, and  $\beta$  is the  $\tau \sim \tau'$  dialectic pair or dimension in which  $\tau$  is the thesis and  $\tau'$  is the antithesis. During the first dialectic recursion,  $\eta_1$ , consideration of the thesis and antithesis results in a synthesis,  $\tau_1 \sim \tau'_1 \rightarrow \sigma_1$  which becomes the second thesis  $\sigma_1 = \tau_2$ . Recursion continues thus. In terms of visualization with the cage painting metaphor, this corresponds to the bar, which represents a particular dialectic pair  $\beta$  or dimension, becoming more opaque (Figure 4). The opaqueness corresponds to M and A improving their understanding of their own and each other's understanding of  $\beta$  through a combination of active listening—Enryo-Sasshi and the cage painting questioning strategy (Figure 2).

As M and A employ the cage painting questioning strategy in combination with Enryo-Sasshi as part of a dialectic flow of thinking about one of the dialectic pairs or dimensions, then one of the cage bars will become more opaque (Figure 4). This signifies an improved level of understanding about each other's perspective concerning that dimension. If this same approach is applied to a number of dimensions, the mathematician and artist can avoid miscommunication about a range of issues. Metaphorically, many bars in their respective cages will become more opaque as a result of the combination of Enryo-Sasshi, dialectic flow of thinking and cage painting. As these approaches are practiced, learners will become better prepared for intercultural communication. In this case, the mathematician and artist can pursue a more meaningful and effective intercultural.



**Figure 4:** Dialectic flow of thinking and painting a cage bar

### Conclusions and Future Steps

Visualization of intercultural communication processes is captured in this paper in three interwoven models: Cage Painting, Active Listening—Enryo-Sasshi and Dialectic flow of thinking. These models are used as tools in developing intercultural communication strategies, in multiple ways. First, the Cage Painting metaphor, as a conceptual tool, has been an inspiration for a design of an online learning environment utilizing simulations (<http://gl.wichita.edu/CPS/>) for resolving intercultural misunderstandings. It makes use of a four-part questioning strategy. The Cage Painting learning environment encourages use of Enryo-Sasshi and dialectic thinking processes. The environment is organized in a manner that supports preparing students for intercultural and global learning experiences. It can be used prior to or parallel with intercultural and global projects [5]. Data collected within this visual learning environment will be used to (a) investigate and (b) visually model how people can improve their intercultural communication strategies.

### References

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