# The Role of Conversational Sculpture in Design Education

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Abstract: This project is part of an ongoing effort to apply the process and outcome of creating conversational sculptures as a means to capture and effectively model the complexity of discussion. Whereas a conversation proceeds linearly in time, the relationship between the topics covered can often be decidedly nonlinear, as the interlocutors build on previous parts of the sequence: adding, subtracting, modifying, providing nuance, suggesting supporting anecdotes or other forms of evidence, and adjusting detail. This paper describes an initial attempt to transfer this form of design activity to the classroom. Students in two design graduate seminars were briefed on the concept and process of creating physical models of conversations, then asked to create a model of their own discussions on a class reading. Results of the pilot indicate that this exercise allowed students to quite thoroughly explore the topic, with an interesting movement from summaries of content to a cycle of expressions of opinions and refinements of those opinions, followed by questions and more refinements. There may also be additional benefits in somewhat slowing down the conversation, allowing for a more evenly distributed contribution from all the students, including those working with English as an additional language.

Keywords: Conversation, conversation models, boundary objects, design education

# 1. Introduction

The flow of conversation in the graduate classroom is one of the key methods of sharing the collaborative learning process around articles read by the students. There are a variety of techniques to help manage the discussion, including turn-taking, moderation by the professor, the use of pre-written discussion questions by the students, hand-raising, or the free-for-all group discussion that involves relatively unhindered give and take. There are also different strategies for keeping a record. Everyone can take individual notes. Someone can be elected to take notes for everyone using a google doc or other form of shared document. In some cases, if there is a board of some kind available, someone can take notes there, using strategies such as creating lists or producing visual topic maps.

In this project, the conversational sculpture framework that had previously been developed for modeling help desk transcripts was repurposed for use instead in the graduate classroom, where it served as a means to support the generation of a collaborative understanding of the key points in an assigned reading.

## 2. Study Objectives

#### 2.1 Research Goals

1) To reinterpret conversational sculpture as a classroom technology

2) To see the effects of this technology on collaborative graduate seminar discussion of an assigned article

#### 2.2 Research Questions

- 1) Can graduate design students understand and use the system?
- 2) What introductory activities are useful?
- 3) What benefits does the system provide?

#### 3. Literature Review

Conversational sculpture can be characterized as a form of boundary object, which is particularly appropriate in the graduate design seminar, since students often have widely varying background training and experience, effectively producing an interdisciplinary environment. At the IIT Institute of Design, for instance, where this case study was conducted, the student population consists of approximately 50% students with a design background, and 50% students from other disciplinary backgrounds.

# 3.1 Knowledge is Highly Specialized

Building on the work of Bourdieu [1] and Lave [9], Carlile [2] describes knowledge often being highly specialized, as it is "localized, embedded, and invested in practice." That specialization is frequently driven by the fact that knowledge within a practice is developed in the service of solving a particular problem or class of problems. It is also rooted in the accumulated body of background knowledge particular both to the individual(s) and much more so, the discipline. Unfortunately, as Carlile observes, that specialization "makes working across functional boundaries and accommodating the knowledge developed in another practice especially difficult." [3].

In response to that difficulty, Carlile defines three (potentially complementary) principles for dealing with the challenges presented by boundaries between communities of practice: (1) Developing a shared syntactic approach to build a common representation of knowledge, (2) a semantic approach focused on enabling the learning about and specifying of differences between communities of practice and (3) a pragmatic approach focused on the facilitation of knowledge transfer and translation.

## 3.2 Boundary Objects

Star and Greisemer [12] define boundary objects as bridges between different social worlds, functioning through a process of knowledge translation. They identify four common forms:

- Repositories, which are ordered collections of objects
- Ideal types represent classes of things
- Coincident boundaries enclose a shared spaced with internal details that may differ slightly
- Standardized forms are explicitly intended as a means of communication amongst different or disconnected groups.

Johansson & Arvola [6] classify boundary objects as a type of structuring resource – an object or method that influences how people perceive situations and interact with each other and their environment. Structuring

resources can influence the perceived options and opportunities for action as well as altering people's description of events and actions that take place within a given environment.

Rasmussen, et al. [11] introduce and build on work by Wenger (1998) that highlights the concept of brokering. Brokering is the process of translating and aligning concepts or ideas across different communities of practice. Because brokers are members of multiple communities of practice, they are more able to expose group members to boundary objects from other communities of practice, thereby initiating boundary encounters. Similarly, brokers can, given their unique perspective, help move community members towards the shared "periphery" of commonality or continuity between two otherwise separate communities of practice.

Pawlowski, et al. [10] propose a boundary object brokering model, seeking to codify the complementary functionality between brokering and boundary objects. They also introduce the concept of convergence, as originally discussed by Star, et al. [12]:

"The concept of convergence was included to describe 'the double process by which information artifacts and social worlds are fitted to each other and come together...a process of mutual constitution' "[13] cited in [10]

This process of convergence is perhaps best seen as the effect of the various forms of brokering, when they are successful in bringing different groups closer together through a greater degree of shared understanding of key concepts/ideas/boundary objects. Evidence for convergence can be seen in adaptation or shifting of boundary objects, adaptation of work existing work practices or through direct evidence of community-to-community brokering [10]

Zhou, et al. [15] introduce a similar focus on integrating activities and context through their use of assemblages, defined as:

"a complex system that includes boundary objects, the practices around these objects (including organizational policies), work processes and coordination mechanisms within these objects, and special functions for designated groups" [15]

Assemblages seem to take the concept further than the boundary object brokering model by integrating intergroup or inter-object coordination methods, which might also be considered to be part of the brokering process.

# 4. Case Study

## 4.1 Method

Participants for this pilot were 13 MDes graduate students in a design seminar called "Writing as Sketching" at the IIT Institute of Design. In the first session, one of the two professors leading the class was present and contributed to the discussion at the request of the students. Also present was a research assistant documenting the process with photos, video, and audio recordings, and the research project lead, who introduced the exercise jointly with the professor. In the second session, both professors were present, as was an additional student. For both sessions, the exercise took place during the first half of a three-hour class. Students were given the option, without penalty, of opting out of the exercise but not the discussion; none opted out of either session.

The particular form of boundary object used in this study was a conversational sculpture, or 3D model of conversation using snippets. The snippets documented the comments made by participants during a review of the chapter on personas by Goodwin [4]. Each comment snippet was documented and placed in a transparent pocket after short exchanges between participants subsided and others picked up. Sets of snippets were organized by

topic headings that formed a horizontal axis within a grid structure. Each snippet was written on color-coded cards to distinguish who made the comment and the vertical position on the grid indicated the time a comment was made relative to others (Figure 1). A third axis organized the snippets by content specific comments, general comments within the subject, and outside comments that included side-tracks and non-sequiturs, for example.



Figure 1. The 3D model of the conversation about personas, showing the rig made of a metal frame strung with monofilament, on which the students hung plastic sleeves containing written comments colour-coded by student.

The participants in the study came from a variety of disciplines, including business, marketing, design, and computer science. Each member had a different perspective on the topic, informed by their experience developing or using personas. One of the main objectives to organizing conversations using the boundary object is to form consensus among the participants or 'brokers' regarding vocabulary and definitions. Conversation surrounding what personas 'are' or 'are not' reinforce what Kelly called "construing" [7]. The construct participants build in their minds to form these definitions is based on the similarity and differences of others in the group [5]. Through the process of conversation and noting each comment made during the conversation the participants not only see their own interpretation of terms or concepts but they see and are influenced by others as well. Visualization of structured conversation also shows the depth of topics covered and the degree in which participants contributed to a topic and to the whole conversation.

The repository boundary object is flexible in its construction where topics of conversation could be returned to if the participants felt a topic was not fully discussed or consensus on a definition was not reached. It also afforded levels of discussion directly related to the topic, and visually represented the focus of the discussion. It was suggested to the group that they create category topics for discussion. Two alternative approaches were suggested. The first was a framework from the material itself. Because the material was new to the participants, they hesitantly agreed that constructs of personas would be covered before opinions could be expressed during the conversation. Fears of manipulating the conversation arose because the topic of the grid were asked to be predefined. These fears were assuaged when it was explained that some definitions, contexts, and methods of using personas may be drawn from the chapter and made into topic headings. Additional topics could be included

with the initial headings at the point where comment exchanges warranted new categories. The second strategy for creating categories included individual constructs defining a preference for their particular point of view, or what Landfield [8] describes in construct theory as the pyramid technique. These constructs formed categories when there was consensus for the individuals preference amongst the group, whether they agreed with the individual's position on the topic or not.

The conversation was recorded for reference of chronological order and confirmation that the comments reflected the written snippets. Photos of the boundary object were taken after all comments had been added as well as at 2 second intervals to capture the construction of the model.

# 5. Observations of Conversational Modeling

#### 5.1 Conversation 1

Participants unanimously reported that they felt the topic was thoroughly discussed, and the instructor also agreed the conversation was detailed in nature compared to other similar discussions of assigned reading. Over 50% of the participants found it neither difficult nor easy in working with the system, however, comments about the initial interactions with the grid seemed difficult, "It's not straightforward enough to understand how to deal with that model directly at the first sight." This was quickly alleviated after the first few cards were added, as expressed by one participant: "once warmed up the process seemed easier." Using a five point Likert scale, only one of the participants reported the task difficult, scoring a four out of five, and one found it to be easy, but no one found the tool to be extreme on either end of the scale.



Figure 2: A composite photo of the conversational model from the first session of the pilot study, with a single continuous line showing the sequence superimposed in Photoshop. Note that the line is anything but sequential.

## 5.2 Analysis

Once the boundary object was completed, an analytical overlay was drawn on the image in order to map out the order of the statements, with a line connecting those preceding and following (Figure 2).

Each statement was assigned a 'type' as follows, according to the nature of the comment; quotations or synopsis, opinions based on reading, questions, list of things, and refinements.

# **Card Color and Comment Position**

Pink: 2, 3, 13, 21, 22, 23, 28, 29
Yellow: 1, 4, 8, 15, 20, 24
Purple: 7, 10, 16
Green: 9, 18
Blue: 5, 6, 19, 27
White (the instructor): 11, 12, 14, 17, 25, 26, 30

## List of Comment Type in Chronological Order

16 Refinement
17 Refinement
18 Question
19 Question
20 Question
21 Opinion based on Reading
22 List of Things
23 List of Things
24 Refinement
25 Opinion based on Reading
26 Opinion based on Reading
27 Opinion based on Reading
28 Opinion based on Reading
29 Refinement
30 Refinement

"Quotations or Synopsis" are comments that can be traced back to the text along a direct path. Of the first five comments, four were either quotes or else a synopsis of the text, as participants recalled the material. Only one more comment was made during the conversation that reflected a quotation type – at the 11th position. This was the instructor as he referenced notes, only to encourage further discussion but not to make a specific point. The second study only found this category if the quotation came from an outside reference where participants could recall a text and author for the text but it was not from the required reading. (These snippets were identified with an\*)

"Opinions based on readings" are more reflective than the synopsis type. The opinion introduced some interpretation of the chapter. A process of internalizing seemed to be part of the opinion because it often was

accompanied by a comparison to outside objects or ideas using the phrase, "its like..." or "I wish it was like..." Opinion types of comments happened mainly after the quotation and synopsis types and again at the end of the conversation in positions 9 through 13, one at 21, and 25 through 28 respectively. During the conversation 'Opinion' was raised as an organizational category for the 2nd layer on the z-axis. Subsequent comments ended up on the second layer and given the opinion type label.

"Questions" were asked later in the conversation and ranged from questions about the specifics of the persona or validity of using personas in industry. Positions 18 and 19 were questions of the participant's assumptions that were affirmed by the group or the instructor. Position 20 was a comment asking a question but was not indicated as a question in the written snippet.

"List of things" are very similar to quotations or synopses but were intentionally written and spoken as listed items during the conversation. These often came directly from text headings but kept in bullet-point form. A list was an indication of many ideas or comments made that could be summed up quickly. For example types of personas were listed in position 4 as primary, secondary, negative and non-exist. As this example shows, the list is not always accurate or complete. Comment 4 was revisited in the 23rd position as an opinion based on reading, but was not documented and therefore does not show up on our boundary object.

"Refinements" followed all of the other types of comments, and were evenly distributed among the participants. They may be viewed as the brokerage points where participants clarify comments as a way of shaping their ideas. What distinguishes them from other types is that they reiterate a preceding comment,--- build on the ideas that preceded it, or further define the previous comment. For example, "I have mapped out various media companies based on their perspectives... org. archetypes", expresses an opinion type that compares personas to organizational archetypes (position 13). This comment is followed by, "details should be useful", "user persona for employee training bring people from different departments on the same page", "especially if personas have quotes so that employees don't need to spend time to catch all the interviews", refining the comparison of org. archetypes to personas by distinguishing the characteristics of personas to unify and summarize.

The comment types helped to determine patterns in the conversation and add meaning to each snippet position. The chronology determined when participants engaged in the conversation but their contribution may be patterned by their involvement with the boundary object or writing of a snippet. The comment type showed the collective cognitive space the participants seemed to be in followed by acts of construing to determine a more refined definition of the topic being discussed.

# 5.3 Conversation 2

The second study using conversational modeling methods in the classroom dealt with material from Grow's 1994 article "The Writing Problems of Visual Thinkers." Eight people participated in the study, using the same documentation system using colored cards as in the first study. The distribution of posted comments was similar to the first study with four posted comments by the lowest contributor and fourteen from the highest contributor, which out-paced the two professors in the class. There was an even distribution of comment types found among the participants, but people who made fewer than five comments only documented opinions based on experience, questions and refinements; this did not hold true for the first conversation.

## 5.4 Comparing conversations 1 and 2

The second conversation was almost double the duration of the first, with only two more participants added to the group. The entire corpus includes 89 dialogue turns taken by the student and professors hand-written onto cards within 255 dialogue turns captured on audio recordings. Of the six types of categories within our conversation criteria; list of things, questions, refinements, opinion of reading, opinion of experience, quotation of text/synopsis all had significant coverage with the lowest use of comment type being 'list of things' with only five snippets. Of the five snippets, only four people used list as a form of documenting what they said in writing, even though spoken lists were recorded during the conversation. Quotes from the text were made with reference to the required reading only in the first conversation; however, quotes from other texts were provided and commented on in the second conversation. (see Quotation or Synopsis \* above) Similar to lists, quotes were supplied by only five of the participants and two of the nine quotes were made by a professor.

Questions and Refinements followed with eighteen and nineteen snippets respectively, with even distribution among both categories and the speakers of the comments. Some questions concerning the text were directed toward the professor, but questions directed toward other students as a way to get them to clarify made up the majority (15 of 19) of the questions asked. This indicates that the questions students had for each other were, in our taxonomy, either refinements or requests for refinement, although they were spoken and documented as questions. Refinements, as defined here, had the most even and widespread distribution between speakers and between conversations. These statements are a way for students to check their belief against the rest of the group and at the same time contribute to moving the conversation forward.

The last comment types were 'opinions based on experience' or 'opinions based on readings'. The opinions categories were defined by an internalization characteristic expressed by the speaker. The comments are more than just synopses of the text, nor are they defined by features encoded on each card. Formation of opinions based on experience or reading included expressions of support or opposition to the information recorded. Interestingly, the largest category was the experienced-based opinions (20 snippets), but they were only expressed in the second conversation and not in the first – where participants stayed closer to the required text in general. This may also be because the paper discussing learning styles reflects personal conditions, compared to the persona paper that discusses an involvement of the subject one must experience if they are to bring those experiences to the discussion.

## 6. Conclusions and Future Work

After a brief discussion about the procedure for capturing the conversation, it became clear that a few additional instructions should be added to the preamble. It would be helpful to have a few clear conversation topics that are determined before the process begins, so that participants understand the preliminary and incomplete nature of the topics that have been selected. Future explanations as to why topics are predetermined, include the following:

- These are general topics that must be discussed in order to begin the conversation.
- All can agree they are topics that would need to be covered.
- Other topics can be added as they form.

It would be an improvement if the conversation were to be documented fully rather than letting participants edit what is written from what is actually said. The audio recording was valuable to compare what was edited out and to reorder the chronology of the comments. In listening to the recording, less attention was paid to when a comment was made and more time was given to seeing to what extent the written snippets accurately represented the topic. In addition to the comparison of comments, noting the time code of audio recording could also be a benefit to analysis and give some indication of comment length. Participants are asked to use note cards of equal size, which can give the impression of equal time dedicated to each comment, independent of the time actually spent on a given topic.

The comment type labels that were developed in the analysis are specific to this conversation, or at least to a conversation of this kind that asks participants to be analytical. Other comment types will need to be defined for other kinds of conversation (e.g. debates, decision-making, question and answer).

Generally, the conversation was typical of graduate students in terms of level of discourse, but the level of engagement seemed to rise, particularly in ESL participants who contributed the largest number of snippets to the grid. Future studies will use conversational sculpture with focus groups, where there is a perennial problem of having to manage the contributions of the entire group in the presence of the most outspoken members. The boundary object model may help to even out the contribution among participants, partly because they are required to pause and document their own comments - then place them on the grid. This gives each member an opportunity to step in without slowing the conversation.

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